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## ATLAS OF SKYLAB ATM/ S056 SUPER-LONG EXPOSURES AND STEPPED-IMAGE FRAMES

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*George C. Marshall Space Flight Center  
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16. ABSTRACT  During the course of Skylab, more than 27 000 photographs (filterheliograms) of the Sun were obtained with the ATM/S056 X-Ray Telescope. Of these pictures, 552 were taken in the "Super-Long" ( $S^L$ ) operational mode, a mode specifically developed for the second and third manned Skylab missions which allowed exposures of arbitrary length. Also, 122 of these $S^L$ exposures displayed "stepped images," resulting from the step-wise transport of the film with the shutter open, thus yielding high-time resolution ( $\approx 0.25$ second) images of bright active region cores and, occasionally, flare kernels. This report presents a description of the $S^L$ mode of operation and tabulates the exposure information regarding the $S^L$ pictures. It also identifies those frames which display stepped images.					
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# ATLAS OF SKYLAB ATM/S056 SUPER-LONG EXPOSURES AND STEPPED-IMAGE FRAMES

## I. INTRODUCTION

During the manned Skylab missions, more than 27 000 photographs (filterheliograms) were obtained with the Apollo Telescope Mount (ATM)/S056 X-Ray Telescope. Of these, 552 resulted from the performance of a specially developed operational mode, used only in the second and third manned missions, called "Super Long" ( $S^L$ ). These  $S^L$  exposures were performed in an attempt to ascertain the sites and magnitudes of weak X-ray emitters in the Sun's corona.

The  $S^L$  mode, which allowed exposures of arbitrary length, was specially developed in that it had not been a regular or routine operational mode with pre-determined exposure length, as were the Single Frame, Patrol, and Active modes used in normal or daily S056 camera operations. Essentially, the mode was effected when the astronaut selected one of the instrument's five X-ray filters, the Single Frame mode and long exposure multiplier, initiated the operation (which opened the shutter), and then depowered the camera. By use of a clock, the astronaut could then perform timed exposures of arbitrary length. At the end of the exposure, he repowered the camera which advanced the film (the shutter remained open) and then terminated the operation.

Each  $S^L$  frame is, thus, seen as two separate pictures: a primary (P) frame and a secondary (S) frame, i. e.,  $P + S$ . Occasionally, the astronaut failed to properly terminate the  $S^L$  exposure, thus yielding anomalously long secondary exposures. Also, he sometimes performed back-to-back  $S^L$  exposures without properly reinitializing the mode. In these instances, more than one secondary frame was generated (i. e.,  $P + S_1 + S_2 + \dots$ ), whereas in most cases the first secondary image ( $S_1$ ) was actually the primary image of the subsequent  $S^L$  operation. Also, although rather infrequently, the astronaut repowered the camera after only a very brief primary exposure, perhaps to verify its proper operation, proper selection of filter, or proper pointing, then depowered it to perform the desired operation. Again, the imagery appeared

as a primary exposure plus two or more secondary frames, dependent on the number of times the camera was depowered and repowered before termination of the operation. In general, the astronauts performed the operations exactly as specified and performed many nonscheduled operations which greatly expanded the S056 coverage.

Figure 1 compares a typical non-S<sup>L</sup> operational frame (in this case, a Patrol Long, Filter 4, bandpass: 6-18Å, exposure: 2:59) with a typical S<sup>L</sup> exposure (same filter, primary exposure: 11:55-1/2). Both photographs were taken on January 21, 1974, and are separated in time by approximately 1 h and 20 min. One clearly distinguishable characteristic of an S<sup>L</sup> frame is the "split" data block lights. This occurs because of the power-down and subsequent power-up before terminating the exposure. The data block lights, the bright dots in columns and rows to the right of the image, describe exactly the camera mode of operation, filter, exposure multiplier, start time (in spacecraft clock days, hours, minutes, seconds, and fraction of second), and stop time (in minutes, seconds, and fraction of second). Visual reading of them yields the exposure information. A typical non-S<sup>L</sup> exposure has no split data lights because the film is stationary from the start of the operation through its termination. In contrast, the S<sup>L</sup> exposure displays "split" data lights where the termination time is recorded after the film has been transported; this is a result of the power-up film-advance concept employed in the design of the S056 instrument.

Figure 2 illustrates the frame format of a typical S<sup>L</sup> exposure and shows how anomalous operations as mentioned previously affect the location and placement of the data lights. Because Skylab also provided a means of recording the instrument's housekeeping data for later transmission and subsequent analysis, the telemetry records, in conjunction with the visual reading of the data block lights, offer a way whereby the investigator can accurately determine the exposure times and know precisely when the astronaut powered-down, powered-up, and terminated the operation (see Section II).

An added bonus of this mode of operation, not realized until after the films were returned to Earth for processing and initial analysis had begun, was that during periods of enhanced solar activity (e.g., bright active regions or flares), the cores of the brightest X-ray emitters, and in some cases flare kernels, were clearly visible as a number of "stepped-image frames" between the primary and secondary pictures. These stepped images resulted from the step-wise film advance with the shutter open which occurred upon repowering the camera after the timed S<sup>L</sup> exposure. Each stepped image was displaced sufficiently and its exposure known accurately, so that a determination of its energy flux and structure versus time could be accomplished. Since the film

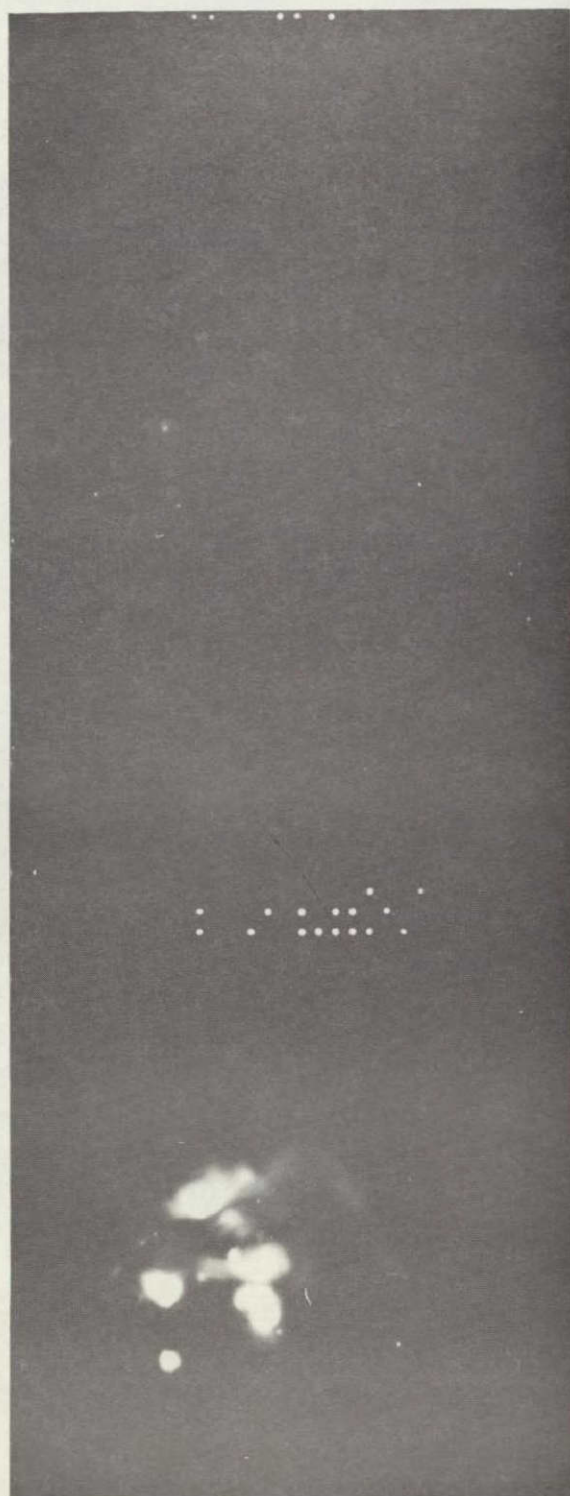
ORIGINAL PAGE IS  
OF POOR QUALITY



- a. Typical non- $S^L$  exposure. Patrol Long, Filter 4, Bandpass 6-18 Å,  
Exposure, 2:59, Date 21 January 1974, DOY 386,  
Start Time 1701:18 $\frac{1}{4}$  UT.

Figure 1. A comparison of a typical and nontypical  $S^L$  exposure.

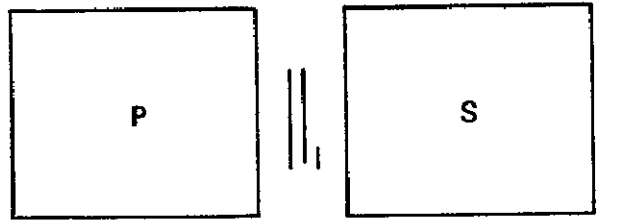




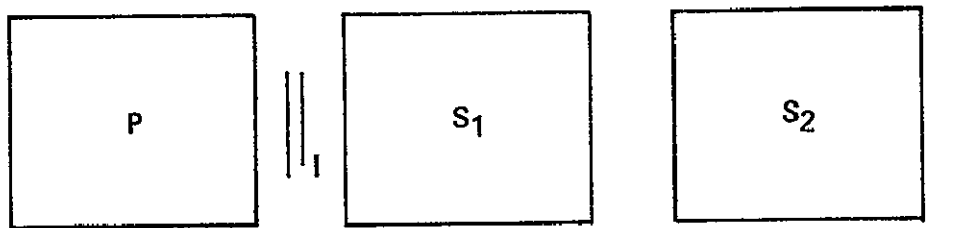
b. Typical  $S^L$  exposure. Filter 4, Bandpass 6-18 Å, Exposure (P) 11:55½, Date 21 January 1974, DOY 386, Start Time 1822:39¼ UT.

Figure 1. (Concluded)

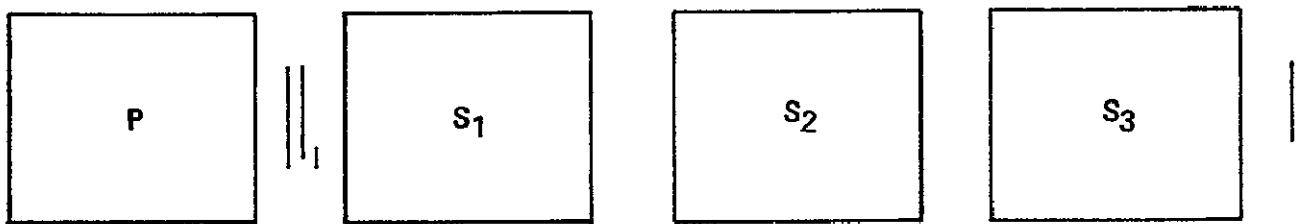




a. Schematic of frame format of a typical  $S^L$  exposure ( $P + S$ ).



b. Schematic of frame format of an atypical  $S^L$  exposure, Case 1:  $P + S_1 + S_2$ .



c. Schematic of frame format of an atypical  $S^L$  exposure, Case 2:  $P + S_1 + S_2 + S_3$ .

Figure 2. Comparison of typical and atypical  $S^L$  exposures.

advance pulse was 40 ms and each pulse was separated in time by 278 ms, an exposure of 238 ms was attained in each stepped image. Also, since 10 discrete pulses were used to advance the film, a typical stepped-image  $S^L$  frame would appear as a primary image, 9 stepped images, and a secondary image. In all, 122 stepped-image frames have been observed.

The purpose of this report is to present exposure information regarding the 552  $S^L$  exposures performed by the Skylab astronauts using the ATM/S056 X-ray Telescope, and to identify those frames which show stepped images. Specific details concerning the S056 instrument description not contained in this report can be found in the work of Walsh et al.<sup>1</sup> Other works<sup>2,3</sup> containing additional details are to be published. An appendix, however, is included to give a few of the specifics concerning the five X-ray filters.

## II. APPROACH

The approach used in the determination of the exposure time for the 552  $S^L$  frames was the following: First, the films were reviewed and the individual  $S^L$  frames identified (by their split data lights). Any anomalous frame formatting was noted, as were stepped-images. Next, the data block lights of each of the  $S^L$  frames were read. This was followed by a painstaking review of the telemetry records, which gave a similar start time and secondary frame stop time, in addition to the stop time of the primary frame, corresponding to the start of the film advance caused by the repowering of the camera. Finally, a review of the S056 console logs, ATM schedule pads, and other miscellaneous data was accomplished to determine the exposure times of those few frames which, either because of noisy telemetry or overlapping images, had erroneous or disguised exposure information.

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1. Walsh, E. J., Sokolowski, T. I., Miller, G. M., Cofield, Jr., K. L., Douglas, J. D., Lewter, B. J., Burke, H. O. and Davis, A. J.: 1974, "Design Characteristics of a Skylab Soft X-ray Telescope." Proc. SPIE 44, 175-184.

2. Underwood, J. H., Milligan, J. E., DeLoach, A. C. and Hoover, R. B.: 1976, "The S056 X-ray Telescope Experiment on the Skylab-Apollo Telescope Mount." Appl. Opts. (in press).

3. DeLoach, A. C., Hoover, R. B., Wilson, R. M., Milligan, J. E. and Underwood, J. H.: 1976, "The Skylab/ATM S056 Solar X-Ray Telescope: Design and Performance." (to be submitted as NASA TN).

Third generation NASA/Johnson Space Center (JSC) produced films were used in the initial determination of the  $S^L$  pictures and the stepped images. The individual frames were visually read and an 'S056 Operations Log' constructed. NASA/Marshall Space Flight Center (MSFC) Data Systems Laboratory provided telemetry records concerning all S056 operational periods. A comparison of these printouts with the  $S^L$  frame entries contained in the S056 Operations Log then allowed the determination of the 'true' primary exposure, as well as the secondary exposure. Where an accurate determination of the exposures could not be achieved either from telemetry records or the general (P + S) exposure information as learned from the data lights (only 12 such cases, of which only 2 could in no way be directly determined), an attempt was made to gain this information from other sources; e.g., crew transcripts, ATM Schedule Pads, Logs, etc.

### III. TABLES

The results of the study to determine  $S^L$  exposures and those frames which displayed stepped images appear in the following tables. Table 1 presents those  $S^L$  frames contained in the Skylab 3 Load 2 (S0212 black-and-white) film; Table 2 presents the Skylab 3 Load 3 (S0212 black-and-white) film; Table 3 presents the SL4 Load 4 (S0212 black-and-white) film; and Table 4 presents the SL4 Load 5 (S0242 color film). Those entries which also display stepped images are indicated by an 's' in the comments column.

'F.N.' lists the  $S^L$  frame by its frame number as compiled in the S056 Operations Log, 'FIL.' identifies the filter used, 'DATE/DOY' the date and day-of-year of the operation, 'START' the start time of the exposure, 'STOP (P)' the stop time of the primary exposure (corresponding to the repower time), 'EXP. (P)' the primary frame exposure time, 'STOP (S)' the stop time of the secondary exposure, 'EXP. (S)' the secondary frame(s) exposure time, and 'COMMENTS' appropriate remarks concerning the frame. Individual legends for each table follow their respective table, and list those appropriate remarks as indicated in the comments column.

TABLE 1. SL3 LOAD 2 (BLACK AND WHITE) SUPER-LONG (S<sup>L</sup>) LISTING

F.N:	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP(S)	EXP. (S)	Comments
1483	2	8/13/73 (225)	0039:17 <sup>3</sup> / <sub>4</sub>	0046:08 <sup>1</sup> / <sub>2</sub>	6:50 <sup>3</sup> / <sub>4</sub>	0059:09 <sup>1</sup> / <sub>2</sub>	13:01	a,b
1876	5	8/14 (226)	0121:34 <sup>1</sup> / <sub>2</sub>	0136:31 <sup>1</sup> / <sub>4</sub>	14:56 <sup>3</sup> / <sub>4</sub>	0245:44 <sup>1</sup> / <sub>4</sub>	69:13	a,c
2919	3	8/16 (228)	1509:33	1519:33 <sup>1</sup> / <sub>4</sub>	10:00 <sup>1</sup> / <sub>4</sub>	1519:51 <sup>1</sup> / <sub>4</sub>	00:18	
2920	3		1520:14 <sup>1</sup> / <sub>4</sub>	1526:13	5:58 <sup>3</sup> / <sub>4</sub>	1526:22	00:09	
2921	5		1655:38	1715:37 <sup>3</sup> / <sub>4</sub>	19:59 <sup>3</sup> / <sub>4</sub>	1715:45 <sup>3</sup> / <sub>4</sub>	00:08	
3455	3	8/17 (229)	2111:58 <sup>1</sup> / <sub>4</sub>	2112:14	00:15 <sup>3</sup> / <sub>4</sub>	2120:54 (S <sub>1</sub> ) 2121:32 (S <sub>2</sub> )	8:40 (S <sub>1</sub> ) 0:38 (S <sub>2</sub> )	d
3540	3	8/18 (230)	1227:21 <sup>1</sup> / <sub>2</sub>	1231:20 <sup>1</sup> / <sub>2</sub>	3:59	1231:23 <sup>1</sup> / <sub>2</sub>	00:03	
3541	3		1233:57 <sup>1</sup> / <sub>2</sub>	1248:56 <sup>3</sup> / <sub>4</sub>	15:59 <sup>1</sup> / <sub>4</sub>	1249:01 <sup>3</sup> / <sub>4</sub>	00:05	
3590	3		1544:05	1545:07	1:02	1549:49	4:43	e
3662	4		1726:04 <sup>3</sup> / <sub>4</sub>	1733:33 <sup>3</sup> / <sub>4</sub>	7:29	1733:47 <sup>3</sup> / <sub>4</sub>	00:14	
3941	3	8/19 (231)	1447:15 <sup>1</sup> / <sub>4</sub>	1459:14 <sup>1</sup> / <sub>4</sub>	11:59	1459:25 <sup>1</sup> / <sub>4</sub>	00:11	
3942	4		1459:33 <sup>1</sup> / <sub>4</sub>	1508:32 <sup>1</sup> / <sub>4</sub>	8:59	1508:46 <sup>1</sup> / <sub>4</sub>	00:14	
4305	3	8/20 (232)	1112:59	1123:28 <sup>3</sup> / <sub>4</sub>	10:29 <sup>3</sup> / <sub>4</sub>	1124:58 <sup>3</sup> / <sub>4</sub>	00:30	
4462	3		1611:25	1621:39 <sup>3</sup> / <sub>4</sub>	10:14 <sup>3</sup> / <sub>4</sub>	1621:46 <sup>3</sup> / <sub>4</sub>	00:07	
4637	5		(2212:08 <sup>1</sup> / <sub>2</sub> )	?	?	?	?	f
4693	4		2339:11	2352:18 <sup>3</sup> / <sub>4</sub>	13:07 <sup>3</sup> / <sub>4</sub>	2352:26 <sup>3</sup> / <sub>4</sub>	00:08	
4718	3	8/21 (233)	0113:56	0119:57	6:01	0123:32 <sup>3</sup> / <sub>4</sub>	3:35 <sup>3</sup> / <sub>4</sub>	

TABLE 1. (Concluded)

F. N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
4724	4	8/22 (235)	0127:26 $\frac{3}{4}$	0133:26 $\frac{3}{4}$	6:00	0133:34 $\frac{3}{4}$	00:08	
5075	3		2320:52	2328:46	7:54	2328:52	00:08	
5417	3		0004:23	0014:25 $\frac{1}{4}$	10:02 $\frac{1}{4}$	0014:31	00:05 $\frac{3}{4}$	
5449	4		(0137:54)	0150:00 $\frac{3}{4}$	(12:06 $\frac{3}{4}$ )	0150:09	00:08 $\frac{1}{4}$	

- a. S<sup>L</sup> exposure not properly terminated. Shutter open for inordinate amount of time (secondary exp.).
- b. Both P and S images bright; SS(400K) ~ 0050. Pointing change in secondary.
- c. Door closed 0140:46 $\frac{1}{4}$ . Aperture door closed 0143:11 $\frac{1}{2}$ . Door reopened 0211:53 $\frac{1}{4}$ . Aperture door reopened 0233:05 $\frac{1}{4}$ . SS(400K) ~ 0143. SR(400K) ~ 0215 (next pass). Crew informed to close shutter.
- d. Multiple secondaries; P + S<sub>1</sub> + S<sub>2</sub>. Primary image is faint. S<sub>1</sub> image is the main exposure (~ 9 min exp.).
- e. Normal P + S exposure pattern; however, secondary image indicated that the crewman cycled to filter 1 with shutter open and repointed. Selected filter 1 1549:28. Terminated exposure 1549:49.
- f. No scheduled S<sup>L</sup> exposure. SS(400K) 2238. Possible exposure terminate times are (2219:38 $\frac{1}{2}$ ), (2227:38 $\frac{1}{2}$ ), or (2235:38 $\frac{1}{2}$ ), implying exposure lengths of (7:30), (15:30) or (23:30), respectively. Telemetry data noisy.

TABLE 2. SL3 LOAD 3 (BLACK AND WHITE) SUPER-LONG ( $s^L$ ) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
591	3	8/25/73 (237)	2343:12 $\frac{1}{4}$	2347:11 $\frac{1}{4}$	3:59	2347:18 $\frac{1}{4}$	:07	
646	3	8/26 (238)	1341:35 $\frac{1}{4}$	1346:35 $\frac{1}{4}$	5:00	1346:42 $\frac{1}{4}$	:07	
995	3	8/27 (239)	1305:57	1309:08 $\frac{3}{4}$	3:11 $\frac{3}{4}$	1309:16 $\frac{3}{4}$	:08	
1653	3	8/28 (240)	1830:25	?	?	(1840:34)	?	a
2041	4	8/29 (241)	(1909:40 $\frac{1}{2}$ )	1924:39	(14:58 $\frac{1}{2}$ )	1924:46	:07	
2445	3	8/31 (243)	0040:26 $\frac{1}{4}$	0055:24	14:57 $\frac{3}{4}$	0055:30 $\frac{1}{4}$	:06 $\frac{1}{4}$	
2773	3	9/1 (244)	0131:06 $\frac{1}{4}$	0151:04 $\frac{3}{4}$	19:58 $\frac{1}{2}$	0151:05	:00 $\frac{1}{4}$	
3031	3	9/2 (245)	0057:09 $\frac{1}{4}$	0111:19 $\frac{1}{2}$	14:10 $\frac{1}{4}$	0111:31	:11 $\frac{1}{2}$	
3278	3	9/3 (246)	0139:50	0154:53	5:03	0154:58	:05	
3300	3		1244:38 $\frac{3}{4}$	1248:40 $\frac{3}{4}$	4:02	1248:45 $\frac{3}{4}$	:05	
3301	4		1250:38 $\frac{3}{4}$	1304:36 $\frac{3}{4}$	13:58	1307:44	3:07 $\frac{1}{4}$	b, s
3326	3		1725:34	1732:33	6:59	1732:40	:07	
3328	4		1841:12 $\frac{3}{4}$	1849:11 $\frac{3}{4}$	7:59	(1849:23 $\frac{1}{4}$ )	(:11 $\frac{1}{2}$ )	s
3330	3		1858:12 $\frac{3}{4}$	?	?	(1903:14)	?	c
3608	3	9/5 (248)	1426:23 $\frac{1}{2}$	1434:22 $\frac{1}{2}$	7:59	1434:29 $\frac{1}{2}$	:07	
3609	3		1519:32 $\frac{1}{4}$	1534:27 $\frac{1}{4}$	4:55	1534:33 $\frac{1}{4}$	:06	
3610	4		1534:59 $\frac{1}{4}$	1549:56	14:56 $\frac{3}{4}$	1550:03	:07	s
3611	5		1550:27 $\frac{1}{2}$	1605:24	14:56 $\frac{1}{2}$	1605:33	:09	



TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
3863	4	9/6 (249)	0232:57 $\frac{1}{4}$	0240:52 $\frac{1}{2}$	7:55 $\frac{1}{4}$	0240:59	:06 $\frac{1}{2}$	S
3994	5		2258:02 $\frac{1}{4}$	2304:01 $\frac{3}{4}$	5:59 $\frac{1}{2}$	2304:08	:06 $\frac{1}{4}$	
4002	3	9/7 (250)	0009:42 $\frac{1}{2}$	0017:37 $\frac{1}{2}$	7:55	0017:46 $\frac{1}{2}$	:09	
4003	4		0018:01 $\frac{1}{2}$	0025:56 $\frac{1}{2}$	7:55	0026:05 $\frac{3}{4}$	:09 $\frac{1}{4}$	S
4004	3		0031:55 $\frac{3}{4}$	0041:55 $\frac{1}{2}$	9:59 $\frac{3}{4}$	0042:04 $\frac{1}{4}$	:08 $\frac{3}{4}$	S
4005	4		0042:48 $\frac{1}{4}$	0049:32 $\frac{1}{2}$	6:44 $\frac{1}{4}$	0049:38 $\frac{1}{4}$	:05 $\frac{3}{4}$	
4024	3		0202:09 $\frac{1}{4}$	0212:18 $\frac{1}{4}$	10:09	0212:27 $\frac{1}{4}$	:09	S
4025	4		0212:33 $\frac{1}{4}$	0221:30	8:56 $\frac{3}{4}$	0221:50 $\frac{3}{4}$	:20 $\frac{3}{4}$	
4198	3		1442:31 $\frac{1}{4}$	1446:58 $\frac{1}{4}$	4:27	1447:08 $\frac{1}{4}$	:10	
4333	3	9/8 (251)	0256:03	0303:24	7:21	0303:26	:02	
4334	4		0303:50	0312:01 $\frac{1}{2}$	8:11 $\frac{1}{2}$	0312:07 $\frac{3}{4}$	:06 $\frac{1}{4}$	
4438	3		1830:53 $\frac{1}{2}$	1844:02 $\frac{3}{4}$	13:09 $\frac{1}{4}$	1844:11 $\frac{3}{4}$	:09	
4440	3		1932:49	1942:45	9:56	1942:53	:08	
4442	4		1953:21 $\frac{1}{4}$	2003:19	9:57 $\frac{3}{4}$	2003:26 $\frac{1}{4}$	:07 $\frac{1}{4}$	S
4474	3	9/9 (252)	0034:13	0045:23	11:10	0045:37	:14	
4476	4		0051:17 $\frac{1}{4}$	0058:17	6:59 $\frac{3}{4}$	0058:24 $\frac{1}{2}$	:07 $\frac{1}{2}$	
4487	3		0211:31 $\frac{3}{4}$	0220:27 $\frac{3}{4}$	8:56	0220:35 $\frac{3}{4}$	:08	
4488	4		0221:08 $\frac{3}{4}$	0230:05 $\frac{3}{4}$	8:57	0230:13	:07 $\frac{1}{4}$	S

TABLE 2. (Continued)

F. N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP(S)	Comments
4502	3	9/10 (253)	1138:16 $\frac{1}{4}$	1143:17 $\frac{1}{4}$	5:01	1143:25 $\frac{1}{4}$	:08	
4699	3		0123:36 $\frac{1}{2}$	0133:33 $\frac{3}{4}$	9:57 $\frac{1}{4}$	0133:40 $\frac{3}{4}$	:07	
4700	4		0133:48 $\frac{3}{4}$	0141:47 $\frac{1}{2}$	7:58 $\frac{3}{4}$	0141:54 $\frac{1}{4}$	:06 $\frac{3}{4}$	
4701	5		0142:03	0149:58 $\frac{1}{4}$	7:55 $\frac{1}{4}$	0150:04 $\frac{3}{4}$	:06 $\frac{1}{2}$	
5008	3		1409:04 $\frac{1}{2}$	1412:35 $\frac{1}{2}$	3:31	1412:41 $\frac{1}{2}$	:06	
5009	3		1505:57 $\frac{1}{2}$	1517:57 $\frac{1}{2}$	12:00	1518:04 $\frac{1}{2}$	:07	
5010	4		1518:32 $\frac{1}{2}$	1530:32 $\frac{1}{4}$	11:59 $\frac{3}{4}$	1530:41 $\frac{1}{4}$	:09	
5011	5		1531:07 $\frac{1}{4}$	1543:04 $\frac{1}{4}$	11:57	1543:14 $\frac{1}{4}$	:10	
5062	3		2129:17 $\frac{1}{4}$	2139:16 $\frac{3}{4}$	9:59 $\frac{1}{2}$	2139:33 $\frac{3}{4}$	:17	
5063	4		2139:43	2149:43 $\frac{1}{4}$	10:00 $\frac{1}{4}$	2149:54 $\frac{1}{4}$	:11	s
5064	5		2150:08 $\frac{1}{4}$	2200:08 $\frac{1}{2}$	10:00 $\frac{1}{4}$	2200:20 $\frac{1}{2}$	:12	s
5065	3		2242:34 $\frac{1}{4}$	?	?	?	?	d
5066	4		(2258:16 $\frac{1}{4}$ )	2313:14 $\frac{1}{4}$	(14:58)	2313:20 $\frac{1}{2}$	:06 $\frac{1}{4}$	s
5068	3		0015:23	0030:26	15:03	0030:33	:07	e
5069	4		0031:07	0046:06 $\frac{3}{4}$	14:59 $\frac{3}{4}$	(0046:13 $\frac{1}{4}$ )	(:06 $\frac{1}{2}$ )	s
5070	5	9/11 (254)	0046:33 $\frac{3}{4}$	0101:33	14:59 $\frac{1}{4}$	0101:39 $\frac{1}{4}$	:06 $\frac{1}{4}$	
5182	3		1900:18 $\frac{3}{4}$	1915:18 $\frac{1}{2}$	14:59 $\frac{3}{4}$	1915:24 $\frac{1}{2}$	:06	e
5183	4		1915:50 $\frac{1}{2}$	1930:50 $\frac{1}{4}$	14:59 $\frac{3}{4}$	1930:56 $\frac{1}{2}$	:06 $\frac{1}{4}$	s

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5184	5	9/12 (255)	1931:21 $\frac{3}{4}$	1945:21	13:59 $\frac{1}{4}$	1945:26 $\frac{1}{4}$	:05 $\frac{1}{4}$	s
5203	3		2346:52	2358:50 $\frac{1}{4}$	11:58 $\frac{1}{4}$	2358:57 $\frac{1}{2}$	:07 $\frac{1}{4}$	
5205	4		0005:36 $\frac{3}{4}$	0014:45 $\frac{1}{4}$	9:08 $\frac{1}{2}$	0014:52 $\frac{1}{4}$	:07	s
5206	5		0015:02	0024:05 $\frac{1}{4}$	9:03 $\frac{1}{4}$	0024:12 $\frac{3}{4}$	:07 $\frac{1}{2}$	
5225	3		0135:33 $\frac{1}{2}$	0144:29 $\frac{1}{2}$	8:56	0144:35 $\frac{1}{2}$	:06	
5226	4		0144:49 $\frac{1}{2}$	0153:45	8:55 $\frac{1}{2}$	0153:52 $\frac{1}{2}$	:07 $\frac{1}{2}$	s
5246	3		(1511:41 $\frac{1}{4}$ )	1521:40	(9:58 $\frac{3}{4}$ )	1521:54	:14	
5247	4		1522:36	1532:36	10:00	1532:44 $\frac{1}{2}$	:08 $\frac{1}{2}$	s
5249	5		1534:26 $\frac{3}{4}$	1544:25 $\frac{3}{4}$	9:59	1544:40 $\frac{3}{4}$	:15	
5250	3		1549:16 $\frac{3}{4}$	?	?	(1558:04 $\frac{1}{2}$ )	?	f
5311	5	9/13 (256)	2332:50 $\frac{3}{4}$	2340:50 $\frac{1}{4}$	7:59 $\frac{1}{2}$	2340:56	:05 $\frac{3}{4}$	
5312	3		(0009:13)	?	?	(0014:19)	?	g
5333	3		0025:11 $\frac{3}{4}$	0030:11 $\frac{1}{4}$	4:59 $\frac{1}{2}$	0030:17 $\frac{1}{2}$	:06 $\frac{1}{4}$	e
5334	4		(0234:13 $\frac{1}{4}$ )	0242:12	(7:58 $\frac{3}{4}$ )	0242:14	:02	s
5413	3		2231:29 $\frac{3}{4}$	2239:28 $\frac{1}{2}$	7:58 $\frac{3}{4}$	2239:52 $\frac{1}{2}$	:14	
5414	4	9/14 (257)	2240:05 $\frac{3}{4}$	2248:05 $\frac{1}{2}$	7:59 $\frac{3}{4}$	2248:20 $\frac{1}{4}$	:14 $\frac{3}{4}$	s
5417	3		0009:35 $\frac{1}{4}$	0016:35 $\frac{1}{4}$	7:00	0016:52 $\frac{1}{4}$	:17	
5418	4		0017:05 $\frac{1}{4}$	0019:15 $\frac{1}{4}$	2:10	0019:30 $\frac{1}{4}$	:15	s

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5419	3		0020:05 $\frac{1}{4}$	0029:04 $\frac{3}{4}$	8:59 $\frac{1}{2}$	0029:46 $\frac{1}{4}$	:41 $\frac{1}{2}$	
5420	4		0029:50 $\frac{1}{4}$	0033:51 $\frac{1}{2}$	4:01 $\frac{1}{4}$	0034:16 $\frac{1}{4}$	:24 $\frac{3}{4}$	s
5464	3		(1353:??)	1405:36	?	1405:42	:06	h
5465	4		1406:37	1419:36 $\frac{3}{4}$	12:59 $\frac{3}{4}$	1419:41 $\frac{3}{4}$	:05	s
5502	3		1837:05 $\frac{1}{4}$	1849:00 $\frac{3}{4}$	11:55 $\frac{1}{2}$	1849:08 $\frac{1}{4}$	:07 $\frac{1}{2}$	
5503	4		1849:19 $\frac{1}{4}$	1901:15 $\frac{1}{2}$	11:56 $\frac{1}{4}$	1901:23	:07 $\frac{1}{2}$	s
5504	5		1901:49 $\frac{1}{2}$	1913:52 $\frac{3}{4}$	12:03 $\frac{1}{4}$	1914:00 $\frac{3}{4}$	:08	
5535	3	9/15 (258)	2222:02 $\frac{3}{4}$	2237:59	15:56 $\frac{1}{4}$	2238:07 $\frac{1}{2}$	:08 $\frac{1}{2}$	e
5536	4		2238:45	2254:41 $\frac{1}{2}$	15:56 $\frac{1}{2}$	(2254:47 $\frac{1}{4}$ )	(:05 $\frac{3}{4}$ )	
5537	3	9/16 (259)	0004:27 $\frac{1}{2}$	0016:27 $\frac{1}{2}$	12:00	0016:33 $\frac{1}{4}$ )	:05 $\frac{3}{4}$	e
5538	4		0017:27 $\frac{3}{4}$	0029:28 $\frac{1}{4}$	12:00 $\frac{1}{2}$	0042:01 $\frac{1}{2}$ (S <sub>1</sub> ) 0042:07 $\frac{3}{4}$ (S <sub>2</sub> )	12:23 $\frac{1}{4}$ (S <sub>1</sub> ) :06 $\frac{1}{4}$ (S <sub>2</sub> )	i
5573	3		2147:22 $\frac{1}{2}$	2159:19 $\frac{1}{2}$	11:57	2159:26 $\frac{1}{2}$	:07	
5574	4		2159:38 $\frac{1}{2}$	2211:35 $\frac{1}{2}$	11:57	2211:43 $\frac{1}{2}$	:08	
5575	5		2212:00 $\frac{3}{4}$	2223:57	11:56 $\frac{1}{4}$	2224:04 $\frac{1}{2}$	:07 $\frac{1}{2}$	
5605	3	9/17 (260)	1620:44 $\frac{1}{4}$	1631:44 $\frac{1}{4}$	11:00	1631:51 $\frac{1}{4}$	:07	
5607	3		1948:58 $\frac{1}{2}$	1953:59	5:00 $\frac{1}{2}$	1954:05 $\frac{1}{4}$	:06 $\frac{1}{4}$	e
5608	4		1954:16 $\frac{1}{4}$	2004:21	10:04 $\frac{3}{4}$	2004:27 $\frac{3}{4}$	:06 $\frac{3}{4}$	

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5610	5	9/18 (261)	2004:50 <sup>3</sup> / <sub>4</sub>	2014:47 <sup>3</sup> / <sub>4</sub>	9:57	2014:56 <sup>1</sup> / <sub>2</sub>	:08 <sup>3</sup> / <sub>4</sub>	j
5645	3		(20??:??)	?	?	(2037:27 <sup>3</sup> / <sub>4</sub> )	?	
5646	4		2037:49 <sup>1</sup> / <sub>4</sub>	2049:54 <sup>1</sup> / <sub>2</sub>	12:05	2050:01 <sup>1</sup> / <sub>2</sub>	:07	
5647	5		2050:30 <sup>1</sup> / <sub>4</sub>	2102:29	11:58 <sup>3</sup> / <sub>4</sub>	2102:37	:08	
5690	3	9/19 (262)	1537:37 <sup>3</sup> / <sub>4</sub>	1546:38	9:00 <sup>1</sup> / <sub>4</sub>	1546:45	:07	e
5709	4		2151:03 <sup>1</sup> / <sub>2</sub>	2200:04	9:00 <sup>1</sup> / <sub>2</sub>	2200:14	:10	s
5710	4	9/20 (263)	(0907:04 <sup>3</sup> / <sub>4</sub> )	0919:46 <sup>3</sup> / <sub>4</sub>	(12:42)	0919:55 <sup>3</sup> / <sub>4</sub>	:09	s
5729	3		1425:04 <sup>3</sup> / <sub>4</sub>	1438:05	13:00 <sup>1</sup> / <sub>4</sub>	1438:23	:18	
5730	4		1439:05	1450:05	11:00	1450:48	:43	
5731	5		(1451:05 <sup>1</sup> / <sub>4</sub> )	1503:05	(11:59 <sup>3</sup> / <sub>4</sub> )	1503:25	:20	
5732	3	9/21 (264)	1746:49 <sup>1</sup> / <sub>2</sub>	1803:45 <sup>1</sup> / <sub>2</sub>	6:56	1803:53 <sup>1</sup> / <sub>2</sub>	:08	e
5772	3		0809:13	0814:24	5:11	0814:30	:06	e
5773	3		0928:14 <sup>3</sup> / <sub>4</sub>	0938:14 <sup>3</sup> / <sub>4</sub>	10:00	0938:27 <sup>3</sup> / <sub>4</sub>	:13	e
5774	4		0938:44 <sup>3</sup> / <sub>4</sub>	0948:44 <sup>3</sup> / <sub>4</sub>	10:00	0948:58 <sup>3</sup> / <sub>4</sub>	:14	
5775	3		0951:43 <sup>3</sup> / <sub>4</sub>	1046:58 <sup>1</sup> / <sub>2</sub>	55:14 <sup>3</sup> / <sub>4</sub>	1047:08 <sup>1</sup> / <sub>2</sub>	:10	
5776	4		1047:28 <sup>1</sup> / <sub>2</sub>	1057:25 <sup>1</sup> / <sub>2</sub>	9:57	1057:37 <sup>1</sup> / <sub>2</sub>	:12	
5777	5		1057:55 <sup>1</sup> / <sub>2</sub>	1108:25 <sup>1</sup> / <sub>2</sub>	10:30	1108:52 <sup>1</sup> / <sub>2</sub>	:27	s
5778	3		1228:46 <sup>1</sup> / <sub>2</sub>	1237:47 <sup>1</sup> / <sub>2</sub>	9:01	1238:01 <sup>1</sup> / <sub>2</sub>	:14	
5780	4		1248:47 <sup>1</sup> / <sub>2</sub>	1253:47 <sup>1</sup> / <sub>4</sub>	4:59 <sup>3</sup> / <sub>4</sub>	1253:57 <sup>1</sup> / <sub>4</sub>	:10	s

TABLE 2. (Concluded)

- a. Telemetry data noisy. Door closed 1842:36 $\frac{1}{4}$ . Door reopened 1914:27. ATM Schedule Pad (Pad) shows: S<sup>L</sup>3 15:00.
- b. Door closed 1300:12 $\frac{3}{4}$ . Door reopened 1333:00 $\frac{1}{2}$ .
- c. Telemetry data noisy. Door closed 1909:54 $\frac{3}{4}$ . Door reopened 1945:49 $\frac{3}{4}$ . Pad shows: S<sup>L</sup>3 8:00, S<sup>L</sup>4 8:00, S<sup>L</sup>5 8:00.
- d. Data lights indecipherable. Pad shows: S<sup>L</sup>3 15:00, S<sup>L</sup>4 15:00, S<sup>L</sup>5 15:00. Telemetry data noisy.
- e. Data lights indecipherable. Times determined via telemetry.
- f. Telemetry data noisy. Log shows SS(400K) ~ 1555.
- g. Telemetry data noisy. Uncertain in data block reading. Log shows S<sup>L</sup>3 5:00 (astronaut confirmed). Exposure performed during night cycle (?)
- h. Telemetry data noisy. Data lights indecipherable in the seconds column.
- i. Multiple secondaries; i. e., P + S<sub>1</sub> + S<sub>2</sub>.
- j. Telemetry data noisy. Data lights indecipherable in the minutes and seconds column. Pad shows S<sup>L</sup>3 12:00, S<sup>L</sup>4 12:00, S<sup>L</sup>5 12:00, SS(400K) 2107.
- s. Stepped-image frame.



TABLE 3. SL4 LOAD 4 (BLACK AND WHITE) SUPER LONG (S<sup>L</sup>) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
275	2	12/17/73 (361)	0130:57 <sup>3</sup> / <sub>4</sub>	0137:52	6:54 <sup>1</sup> / <sub>4</sub>	0138:12 <sup>1</sup> / <sub>2</sub>	:20 <sup>1</sup> / <sub>2</sub>	s
276	4		0138:29 <sup>3</sup> / <sub>4</sub>	0141:07 <sup>3</sup> / <sub>4</sub>	2:38	0141:17 <sup>1</sup> / <sub>2</sub>	:09 <sup>3</sup> / <sub>4</sub>	s
319	1		1326:15 <sup>3</sup> / <sub>4</sub>	1334:14 <sup>3</sup> / <sub>4</sub>	7:59	1355:42 <sup>1</sup> / <sub>2</sub> (S <sub>1</sub> ) 1359:31 <sup>1</sup> / <sub>2</sub> (S <sub>2</sub> )	21:27 <sup>3</sup> / <sub>4</sub> (S <sub>1</sub> ) 3:39 (S <sub>2</sub> )	a
320	4		1402:51 <sup>3</sup> / <sub>4</sub>	1414:18 <sup>3</sup> / <sub>4</sub>	11:27	1414:49 <sup>3</sup> / <sub>4</sub>	:31	
322	4		1456:06 <sup>1</sup> / <sub>2</sub>	1504:00 <sup>1</sup> / <sub>2</sub>	7:54	1504:22 <sup>1</sup> / <sub>2</sub>	:22	s
324	2		1514:46 <sup>3</sup> / <sub>4</sub>	1524:07	9:20 <sup>1</sup> / <sub>4</sub>	(1524:27 <sup>1</sup> / <sub>2</sub> )	(:20 <sup>1</sup> / <sub>2</sub> )	
325	2		1526:23 <sup>3</sup> / <sub>4</sub>	1546:43 <sup>1</sup> / <sub>2</sub>	20:19 <sup>3</sup> / <sub>4</sub>	1547:19 <sup>1</sup> / <sub>2</sub>	:36	
326	4		1629:50 <sup>1</sup> / <sub>4</sub>	1637:46 <sup>1</sup> / <sub>4</sub>	7:56	1639:25 <sup>1</sup> / <sub>4</sub>	:39	s
327	2		1646:05 <sup>1</sup> / <sub>4</sub>	1656:08 <sup>1</sup> / <sub>4</sub>	10:03	1656:26	:17 <sup>3</sup> / <sub>4</sub>	
328	4		1657:04 <sup>1</sup> / <sub>2</sub>	1707:06 <sup>1</sup> / <sub>4</sub>	10:01 <sup>3</sup> / <sub>4</sub>	1707:37 <sup>1</sup> / <sub>4</sub>	:31	
329	5		1709:35 <sup>1</sup> / <sub>4</sub>	1720:34 <sup>1</sup> / <sub>2</sub>	10:59 <sup>1</sup> / <sub>4</sub>	(1721:37 <sup>1</sup> / <sub>4</sub> )	(1:02 <sup>3</sup> / <sub>4</sub> )	
331	2		1805:59	1818:00	12:01	1818:06	:06	s
332	4		1937:58 <sup>1</sup> / <sub>2</sub>	1950:01 <sup>1</sup> / <sub>2</sub>	12:03	1950:08 <sup>1</sup> / <sub>2</sub>	:07	s
333	1		2110:53 <sup>1</sup> / <sub>2</sub>	2120:55 <sup>3</sup> / <sub>4</sub>	10:02 <sup>1</sup> / <sub>4</sub>	2121:03 <sup>1</sup> / <sub>4</sub>	:07 <sup>1</sup> / <sub>2</sub>	
334	5		2242:09	2254:12	12:03	2254:17	:05	
335	2	12/28 (362)	0018:06 <sup>3</sup> / <sub>4</sub>	0030:04 <sup>3</sup> / <sub>4</sub>	11:58	0030:33 <sup>3</sup> / <sub>4</sub>	:29	s
541	2		2341:55 <sup>3</sup> / <sub>4</sub>	2352:13	10:17 <sup>1</sup> / <sub>4</sub>	2352:23 <sup>3</sup> / <sub>4</sub>	:10 <sup>3</sup> / <sub>4</sub>	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
542	3	12/29 (363)	0011:16 $\frac{1}{2}$	0027:18 $\frac{1}{4}$	16:01 $\frac{3}{4}$	0035:02	7:43 $\frac{3}{4}$	b
543	3		0122:59 $\frac{1}{2}$	0143:09 $\frac{1}{4}$	10:10	0143:21 $\frac{1}{4}$	:12	
544	3		0304:44 $\frac{1}{2}$	0324:46	20:01 $\frac{1}{2}$	0324:52 $\frac{3}{4}$	:06 $\frac{3}{4}$	
563	2		1412:11 $\frac{1}{4}$	1417:10 $\frac{1}{4}$	4:59	1417:15 $\frac{1}{4}$	:05	
564	1	12/30 (364)	1418:24 $\frac{1}{4}$	1424:12 $\frac{1}{4}$	5:48	1424:21 $\frac{1}{4}$	:09	s
565	3		0203:46 $\frac{1}{4}$	?	?	(0215:30)	?	
566	4		0224:57 $\frac{3}{4}$	0253:01	28:03 $\frac{1}{4}$	0253:21	:20	
591	3		1435:55	1518:01 $\frac{3}{4}$	42:06 $\frac{3}{4}$	1524:07 $\frac{3}{4}$	6:06	
592	4		1607:12 $\frac{3}{4}$	1652:01	44:48 $\frac{1}{4}$	1652:10 $\frac{1}{4}$	:09 $\frac{1}{4}$	
594	2		2041:39	2049:42	8:03	2049:48	:06	
595	4		2050:04	2058:03	7:59	2058:10	:07	
596	1		2058:52	2108:50	9:58	2108:57	:07	
597	5		2109:24	2129:23	19:59	2129:31 $\frac{1}{2}$	:08 $\frac{1}{2}$	
598	4		2226:54 $\frac{1}{2}$	2304:02 $\frac{1}{2}$	37:08	2304:14 $\frac{1}{2}$	:12	
619	1	12/31 (365)	0153:13	0201:11 $\frac{1}{4}$	7:58 $\frac{1}{4}$	0201:17 $\frac{3}{4}$	:06 $\frac{1}{2}$	
620	1		0201:23 $\frac{1}{2}$	0209:07	7:43 $\frac{1}{2}$	0209:21 $\frac{3}{4}$	:14 $\frac{3}{4}$	
645	4		1426:45	1434:47	8:02	1435:00	:13	
646	2		1525:38 $\frac{3}{4}$	1610:01 $\frac{1}{2}$	44:22 $\frac{3}{4}$	(1610:14 $\frac{3}{4}$ )	(:13 $\frac{1}{4}$ )	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
659	1	1/1 (366)	2157:34 $\frac{3}{4}$	2205:34 $\frac{3}{4}$	8:00	2205:42 $\frac{3}{4}$	:08	
660	5		2206:04 $\frac{3}{4}$	2214:17 $\frac{1}{2}$	8:12 $\frac{3}{4}$	2214:23 $\frac{1}{4}$	:05 $\frac{3}{4}$	
661	2		0040:16	0048:16	8:00	0048:24	:08	
662	2		0048:43	0056:43	8:00	0056:55	:12	
705	1		0239:40 $\frac{3}{4}$	0247:40 $\frac{3}{4}$	8:00	0247:48 $\frac{3}{4}$	:08	
706	5		0248:02 $\frac{3}{4}$	0256:01 $\frac{3}{4}$	7:59	0256:14 $\frac{3}{4}$	:13	
731	2		2053:07 $\frac{3}{4}$	2058:08 $\frac{1}{2}$	5:00 $\frac{3}{4}$	2059:31 $\frac{3}{4}$	:23 $\frac{1}{4}$	
732	2		2059:38 $\frac{3}{4}$	2107:43 $\frac{3}{4}$	8:05	2107:51 $\frac{3}{4}$	:08	
733	2		2108:04 $\frac{3}{4}$	2116:05 $\frac{3}{4}$	8:01	2116:18 $\frac{3}{4}$	:13	
734	2		2258:49 $\frac{1}{4}$	2316:07	17:17 $\frac{3}{4}$	2316:20	:13	
765	2	1/2 (367)	1540:51 $\frac{1}{2}$	1548:52 $\frac{1}{2}$	8:01	1549:56 $\frac{1}{2}$	1:04	
766	1		1600:23 $\frac{1}{2}$	1607:35	7:11 $\frac{1}{2}$	1607:51 $\frac{1}{4}$	:16 $\frac{1}{4}$	
767	4		1608:09	1618:09	10:00	1652:49 $\frac{1}{2}$	34:40 $\frac{1}{2}$	d, s
834	2	1/3/74 (368)	1215:59	1223:02	7:03	1223:09	:07	s
835	4		1223:24	1230:22 $\frac{3}{4}$	6:58 $\frac{3}{4}$	1230:30 $\frac{3}{4}$	:08	
964	1		1953:45 $\frac{1}{2}$	2001:46 $\frac{1}{2}$	8:01	2001:53 $\frac{3}{4}$	:07 $\frac{1}{4}$	
965	4		2002:14 $\frac{3}{4}$	2021:02 $\frac{1}{4}$	18:47 $\frac{1}{2}$	2021:15 $\frac{1}{2}$	:13 $\frac{1}{4}$	e
966	2		2139:22 $\frac{1}{2}$	2154:10	14:47 $\frac{1}{2}$	2154:25 $\frac{1}{2}$	:15 $\frac{1}{2}$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
985	1	1/4 (369)	1304:56 $\frac{1}{4}$	1313:09 $\frac{3}{4}$	8:13 $\frac{1}{2}$	1313:28 $\frac{1}{2}$	:18 $\frac{3}{4}$	f
986	4		1313:42 $\frac{3}{4}$	1322:02 $\frac{1}{2}$	8:19 $\frac{3}{4}$	1322:14 $\frac{1}{2}$	:12	
987	1		1405:59 $\frac{1}{2}$	1414:13 $\frac{1}{2}$	8:14	1414:54 $\frac{1}{2}$	:41	
988	4		1415:01 $\frac{1}{2}$	1423:10 $\frac{1}{2}$	8:09	1423:22 $\frac{1}{2}$	:12	
989	2		1423:30	1431:37 $\frac{1}{2}$	8:07 $\frac{1}{2}$	1431:50 $\frac{1}{2}$	:13	
990	5		1432:08 $\frac{1}{2}$	1440:54 $\frac{1}{2}$	8:46	1443:57 $\frac{1}{4}$	3:02 $\frac{3}{4}$	
1003	1		1545:51 $\frac{1}{4}$	1552:55 $\frac{1}{4}$	7:04	1553:18 $\frac{1}{4}$	:23	
1004	5		1553:25 $\frac{1}{4}$	1600:24 $\frac{1}{4}$	6:59	1601:28 $\frac{1}{4}$	1:04	
1041	4		1747:33	1757:40 $\frac{1}{2}$	10:07 $\frac{1}{2}$	1806:48 $\frac{1}{2}$	9:08	
1102	5	1/5 (370)	0138:24 $\frac{1}{4}$	0147:20 $\frac{1}{4}$	8:56	0147:30 $\frac{1}{4}$	:10	e
1128	2		1344:16	1351:15	6:59	1351:29	:14	
1147	4		1401:17 $\frac{1}{4}$	1410:32 $\frac{1}{2}$	9:15 $\frac{1}{4}$	1410:52	:19 $\frac{1}{2}$	
1158	2		1515:59	1553:06 $\frac{3}{4}$	37:07 $\frac{3}{4}$	1553:23 $\frac{3}{4}$	:17	
1166	4		1702:05 $\frac{1}{4}$	1710:05 $\frac{1}{4}$	8:00	1710:12 $\frac{1}{2}$	:07 $\frac{1}{4}$	
1167	5		1710:35	1718:43 $\frac{3}{4}$	8:08 $\frac{3}{4}$	1718:53 $\frac{1}{2}$	:09 $\frac{3}{4}$	
1175	1		1811:19 $\frac{1}{2}$	1819:24 $\frac{1}{2}$	8:05	1819:46 $\frac{1}{2}$	:22	
1176	2		1819:53 $\frac{1}{2}$	1827:52 $\frac{1}{4}$	7:58 $\frac{3}{4}$	1828:01 $\frac{1}{4}$	:09	
1178	2		1847:04	1852:28 $\frac{1}{4}$	5:24 $\frac{1}{4}$	1852:41 $\frac{1}{4}$	:13	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
1179	1	1/6 (371)	1937:46 $\frac{1}{4}$	1945:45 $\frac{1}{4}$	7:59	1946:09 $\frac{1}{4}$	:24	
1180	5		1946:20 $\frac{1}{4}$	1954:21	8:03 $\frac{3}{4}$	1954:33	:12	
1181	2		1955:28	2003:27	7:59	2003:37	:10	s
1182	4		2003:59	2011:59 $\frac{1}{2}$	8:00 $\frac{1}{2}$	2013:45 $\frac{1}{2}$	1:46	
1285	1		1451:13 $\frac{3}{4}$	1459:12	7:58 $\frac{1}{4}$	1459:19 $\frac{1}{4}$	:07 $\frac{1}{4}$	
1295	4		1559:23 $\frac{3}{4}$	1607:23 $\frac{3}{4}$	8:00	1607:32 $\frac{3}{4}$	:09	
1308	1		1619:52 $\frac{1}{2}$	1624:52 $\frac{1}{4}$	4:59 $\frac{3}{4}$	1625:00 $\frac{1}{2}$	:08 $\frac{1}{4}$	
1321	2		2030:32	2034:32 $\frac{1}{2}$	4:00 $\frac{1}{2}$	2034:38 $\frac{3}{4}$	:06 $\frac{1}{4}$	s
1322	4		2035:04 $\frac{1}{2}$	2047:04 $\frac{3}{4}$	12:00 $\frac{1}{4}$	2047:13 $\frac{3}{4}$	:09	s
1379	3		2345:01 $\frac{1}{2}$	0034:02	49:00 $\frac{1}{2}$	0034:18	:16	
1386	4	1/7 (372)	0258:58 $\frac{3}{4}$	0306:58 $\frac{3}{4}$	8:00	0307:09 $\frac{3}{4}$	:11	s
1387	5		0307:17 $\frac{3}{4}$	0315:20 $\frac{3}{4}$	8:03	0315:40 $\frac{3}{4}$	:20	
1388	1		0315:58 $\frac{3}{4}$	0323:59 $\frac{3}{4}$	8:01	0324:21 $\frac{3}{4}$	:22	
1390	2		0327:56 $\frac{3}{4}$	0332:56 $\frac{3}{4}$	5:00	0333:15 $\frac{3}{4}$	:19	s
1398	4		1234:19 $\frac{3}{4}$	1242:15 $\frac{1}{2}$	7:55 $\frac{3}{4}$	1243:36	1:20 $\frac{1}{2}$	s
1421	5		1412:43	1423:43	11:00	1423:54	:11	
1445	2		1537:58 $\frac{3}{4}$	1543:58 $\frac{1}{4}$	5:59 $\frac{1}{2}$	1544:14 $\frac{3}{4}$	:16 $\frac{1}{2}$	s
1446	4		1544:26 $\frac{3}{4}$	1554:27 $\frac{1}{2}$	10:00 $\frac{3}{4}$	1554:42	:14 $\frac{1}{2}$	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
1460	1	1/8 (373)	1953:55 <sup>3</sup> / <sub>4</sub>	1959:58 <sup>3</sup> / <sub>4</sub>	6:03	2000:04 <sup>3</sup> / <sub>4</sub>	:06	
1461	5		2000:35 <sup>3</sup> / <sub>4</sub>	2010:35 <sup>3</sup> / <sub>4</sub>	10:00	2010:42 <sup>3</sup> / <sub>4</sub>	:07	
1462	2		2013:57 <sup>1</sup> / <sub>2</sub>	2017:57 <sup>3</sup> / <sub>4</sub>	4:00 <sup>1</sup> / <sub>4</sub>	2018:03 <sup>1</sup> / <sub>2</sub>	:05 <sup>3</sup> / <sub>4</sub>	s
1463	4		2018:15 <sup>1</sup> / <sub>2</sub>	2026:15 <sup>1</sup> / <sub>2</sub>	8:00	2026:30	:14 <sup>1</sup> / <sub>2</sub>	s
1482	2		0104:39	0109:50	5:11	0110:00	:10	s
1483	4		0110:07	0118:29	8:22	0118:39 <sup>3</sup> / <sub>4</sub>	:10 <sup>3</sup> / <sub>4</sub>	s
1532	1		1443:03 <sup>3</sup> / <sub>4</sub>	1453:05 <sup>1</sup> / <sub>2</sub>	10:01 <sup>3</sup> / <sub>4</sub>	1453:33 <sup>3</sup> / <sub>4</sub>	:28 <sup>1</sup> / <sub>4</sub>	
1533	5		1453:55 <sup>1</sup> / <sub>2</sub>	1503:57 <sup>3</sup> / <sub>4</sub>	10:02 <sup>1</sup> / <sub>4</sub>	1504:19 <sup>3</sup> / <sub>4</sub>	:22	
1535	4		1508:18 <sup>3</sup> / <sub>4</sub>	?	?	(1517:33 <sup>3</sup> / <sub>4</sub> )	?	g
1537	2		1906:47	1913:48 <sup>3</sup> / <sub>4</sub>	7:01 <sup>3</sup> / <sub>4</sub>	1913:54 <sup>1</sup> / <sub>4</sub>	:05 <sup>1</sup> / <sub>2</sub>	s
1538	4		1914:11	1921:11	7:00	1921:17	:06	s
1551	1		1941:48 <sup>1</sup> / <sub>2</sub>	1949:48 <sup>3</sup> / <sub>4</sub>	8:00 <sup>1</sup> / <sub>4</sub>	1949:58 <sup>1</sup> / <sub>4</sub>	:09 <sup>1</sup> / <sub>2</sub>	h
1552	5		1950:05 <sup>1</sup> / <sub>2</sub>	1955:30 <sup>1</sup> / <sub>4</sub>	5:24 <sup>3</sup> / <sub>4</sub>	1955:42	:11 <sup>3</sup> / <sub>4</sub>	
1565	5		2047:24 <sup>1</sup> / <sub>2</sub>	2053:03	5:28 <sup>1</sup> / <sub>2</sub>	2101:19 <sup>3</sup> / <sub>4</sub> (S <sub>1</sub> ) 2101:25 <sup>3</sup> / <sub>4</sub> (S <sub>2</sub> )	8:16 <sup>3</sup> / <sub>4</sub> (S <sub>1</sub> ) :06 (S <sub>2</sub> )	i
1566	1		2101:49 <sup>3</sup> / <sub>4</sub>	2109:48 <sup>3</sup> / <sub>4</sub>	7:59	2109:54 <sup>1</sup> / <sub>2</sub>	:05 <sup>3</sup> / <sub>4</sub>	
1567	2		2115:57	2125:57 <sup>3</sup> / <sub>4</sub>	10:00 <sup>3</sup> / <sub>4</sub>	2126:02 <sup>3</sup> / <sub>4</sub>	:05	s
1707	4	1/9 (374)	1845:02	1852:37 <sup>1</sup> / <sub>2</sub>	7:35 <sup>1</sup> / <sub>2</sub>	1852:53 <sup>1</sup> / <sub>2</sub>	:16	s



TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1708	5	1/10 (375)	1853:04 $\frac{1}{4}$	1902:15 $\frac{3}{4}$	9:11 $\frac{1}{2}$	1902:28 $\frac{3}{4}$	:13	
1709	2		1908:25	1914:01 $\frac{3}{4}$	5:36 $\frac{3}{4}$	1914:16 $\frac{3}{4}$	:15	s
1728	4		2313:57 $\frac{1}{4}$	2319:10 $\frac{3}{4}$	5:13 $\frac{1}{2}$	2319:21 $\frac{1}{4}$	:10 $\frac{1}{2}$	s
1765	4		1628:38	1641:33 $\frac{3}{4}$	12:55 $\frac{3}{4}$	1641:44	:10 $\frac{1}{4}$	
1772	4		1805:31 $\frac{3}{4}$	1814:20 $\frac{1}{2}$	8:48 $\frac{3}{4}$	1814:31 $\frac{1}{4}$	:10 $\frac{3}{4}$	s
1774	5		1815:07 $\frac{1}{2}$	1819:13	4:05 $\frac{1}{2}$	1819:29 $\frac{1}{4}$	:16 $\frac{1}{4}$	
1775	5		1824:41 $\frac{3}{4}$	1834:09 $\frac{1}{2}$	9:27 $\frac{3}{4}$	1834:30 $\frac{1}{4}$	:20 $\frac{3}{4}$	
1838	4		2102:35	2112:16	9:41	2112:28	:12	
1840	5		2117:08	2127:12	10:04	2127:21	:09	
1841	1		2127:59	2136:05	8:06	2136:16	:11	
1842	2		2136:21	?	?	(2141:12 $\frac{1}{4}$ )	?	j, s
1861	4		2259:54 $\frac{3}{4}$	2303:00 $\frac{3}{4}$	3:06	2303:15 $\frac{3}{4}$	:15	h
1929	4	1/11 (376)	1535:47	1547:35	11:48	1547:46	:11	s
1930	5		1548:01	1600:40	12:39	1600:50 $\frac{3}{4}$	:10 $\frac{3}{4}$	
1932	1		1604:15 $\frac{1}{2}$	1616:46	12:30 $\frac{1}{2}$	1617:03 $\frac{1}{2}$	:17 $\frac{1}{2}$	
2094	2		2202:19 $\frac{3}{4}$	2208:22	6:02 $\frac{1}{4}$	2208:32	:10	s
2095	2		2208:45	2214:48 $\frac{1}{4}$	6:03 $\frac{1}{4}$	2215:07 $\frac{1}{4}$	:19	s
2109	2		2358:25 $\frac{1}{4}$	0006:30 $\frac{1}{4}$	8:05	0006:37 $\frac{3}{4}$	:07 $\frac{1}{2}$	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
2477	5	1/13 (378)	1439:12 $\frac{1}{2}$	1447:47 $\frac{3}{4}$	8:35 $\frac{1}{4}$	1448:02 $\frac{1}{2}$	:14 $\frac{3}{4}$	
2478	1		1448:25	1457:24 $\frac{3}{4}$	8:59 $\frac{3}{4}$	1457:40 $\frac{3}{4}$	:16	s
2766	5		2032:06 $\frac{3}{4}$	2040:06 $\frac{3}{4}$	8:00	2040:12 $\frac{3}{4}$	:06	
2767	1		2040:24 $\frac{3}{4}$	2048:25	8:00 $\frac{1}{4}$	2048:31	:06	s
2768	4		2048:47 $\frac{1}{2}$	2054:47 $\frac{3}{4}$	6:00 $\frac{1}{4}$	2054:55 $\frac{3}{4}$	:08	s
2886	4	1/14 (379)	1221:41 $\frac{3}{4}$	1231:56 $\frac{3}{4}$	10:14	1235:14 $\frac{1}{4}$	3:18	s
2888	5		1237:11 $\frac{1}{4}$	1246:54 $\frac{1}{4}$	9:43	1247:09 $\frac{1}{4}$	:15	
2907	5		1357:52 $\frac{1}{2}$	1405:54	8:01 $\frac{1}{2}$	1406:01	:07	
2908	1		1406:26	1415:01	8:35	1415:55	:54	
2921	5		1841:23 $\frac{1}{4}$	1849:13 $\frac{1}{4}$	7:50	1849:24 $\frac{3}{4}$	:11 $\frac{1}{2}$	
2923	1		1855:10 $\frac{1}{4}$	1900:03 $\frac{1}{2}$	4:53 $\frac{1}{4}$	1900:09 $\frac{3}{4}$	:06 $\frac{1}{4}$	
2924	5		1942:01 $\frac{1}{2}$	1950:01	7:59 $\frac{1}{2}$	1950:15	:14	
2925	1		(1950:38 $\frac{3}{4}$ )	1958:49 $\frac{1}{4}$	(8:10 $\frac{1}{2}$ )	2013:03 $\frac{1}{4}$ (S <sub>1</sub> ) 2013:15 $\frac{3}{4}$ (S <sub>2</sub> )	14:14 (S <sub>1</sub> ) :12 $\frac{1}{2}$ (S <sub>2</sub> )	k
2926	2		2013:33	2021:34 $\frac{3}{4}$	8:01 $\frac{3}{4}$	2021:42 $\frac{1}{4}$	:07 $\frac{1}{2}$	s
3089	4		1330:32	1331:04	:32	1340:26 (S <sub>1</sub> ) 1341:37 (S <sub>2</sub> )	9:22 (S <sub>1</sub> ) 1:11 (S <sub>2</sub> )	1, s
3254	4	1/15 (380)	1735:11 $\frac{1}{4}$	1743:12	8:00 $\frac{3}{4}$	1743:22 $\frac{1}{4}$	:10 $\frac{1}{4}$	s
3261	5		1747:05	1755:08 $\frac{1}{2}$	8:03 $\frac{1}{2}$	1755:15 $\frac{1}{4}$	:06 $\frac{3}{4}$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
3268	1	1/16 (381)	1757:38 $\frac{1}{4}$	1805:37 $\frac{3}{4}$	7:59 $\frac{1}{2}$	1805:44	:06 $\frac{1}{4}$	s
3275	2		1808:05 $\frac{1}{4}$	1813:03 $\frac{3}{4}$	4:58 $\frac{1}{2}$	1813:11 $\frac{1}{4}$	:07 $\frac{1}{2}$	
3282	5		1859:29	1907:33	8:04	1907:58	:25	
3284	1		1908:12	1916:08 $\frac{1}{4}$	7:56 $\frac{1}{4}$	1916:29 $\frac{3}{4}$	:21 $\frac{1}{2}$	
3285	2		1916:53 $\frac{1}{4}$	1921:59	5:05 $\frac{3}{4}$	1922:23	:24	
3497	4		0149:08	0202:08	13:00	0202:17	:09	
3750	5		1955:31	2003:34	8:03	2003:53	:19	
3751	1		(2004:01 $\frac{1}{4}$ )	2012:01 $\frac{1}{4}$	(8:00)	2032:05 $\frac{1}{4}$	20:04	
3752	2		2036:05	2044:23 $\frac{3}{4}$	8:18 $\frac{3}{4}$	2044:34 $\frac{3}{4}$	:11	
3753	4		2044:39 $\frac{3}{4}$	2050:24 $\frac{3}{4}$	5:45	2050:35 $\frac{3}{4}$	:11	
3826	4	1/17 (382)	2318:53 $\frac{1}{2}$	2328:54 $\frac{1}{2}$	10:01	2329:01 $\frac{1}{2}$	:08	s
4290	1		1744:05 $\frac{1}{2}$	1752:04	7:58 $\frac{1}{2}$	1752:17	:13	s
4291	2		1752:33 $\frac{3}{4}$	1800:33 $\frac{1}{2}$	7:59 $\frac{3}{4}$	1800:43 $\frac{3}{4}$	:10 $\frac{1}{4}$	
4292	4		1813:08 $\frac{3}{4}$	1821:06 $\frac{1}{4}$	7:57 $\frac{1}{2}$	1821:24	:17 $\frac{3}{4}$	
4294	5		1822:15 $\frac{1}{2}$	1829:54 $\frac{1}{4}$	7:38 $\frac{3}{4}$	1830:05 $\frac{1}{4}$	:11	
4295	5		1831:59 $\frac{1}{2}$	1838:31 $\frac{1}{4}$	6:31 $\frac{3}{4}$	1838:54 $\frac{1}{4}$	:23	
4433	4		2112:35 $\frac{3}{4}$	2132:43 $\frac{3}{4}$	20:08	2132:54	:10 $\frac{1}{4}$	
4434	5		2133:02 $\frac{1}{2}$	2148:14 $\frac{3}{4}$	15:12 $\frac{1}{4}$	2148:36 $\frac{3}{4}$	:22	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
4710	4	1/18 (383)	1610:53	1619:43	8:50	1619:51	:08	
4711	5		1619:59	1624:37	4:38	1624:49	:12	
4718	2		1732:58 $\frac{1}{4}$	1743:38 $\frac{3}{4}$	10:40 $\frac{1}{2}$	1743:57 $\frac{3}{4}$	:19	S
4719	4		1744:11 $\frac{1}{2}$	1751:41	7:29 $\frac{1}{2}$	1751:50 $\frac{1}{4}$	:09 $\frac{1}{4}$	
4720	5		1751:57 $\frac{3}{4}$	1759:34 $\frac{3}{4}$	7:37	1759:54 $\frac{3}{4}$	:20	
4838	1		2149:36 $\frac{1}{2}$	2157:29	7:52 $\frac{1}{2}$	2157:47	:18	
4839	5		2157:58	2205:56	7:58	2206:31	:35	
4840	4		2216:35	2226:34	9:59	2226:42	:08	S
4841	2	1/19 (384)	2226:51	2233:45	6:54	2233:58	:13	S
4898	1		1219:45 $\frac{3}{4}$	1231:10 $\frac{3}{4}$	11:25	1231:23 $\frac{3}{4}$	:13	
4899	5		1231:37 $\frac{3}{4}$	1240:30 $\frac{3}{4}$	8:53	1240:41 $\frac{3}{4}$	:11	
4948	4		1822:54 $\frac{1}{4}$	1830:15 $\frac{1}{4}$	7:21	1830:27 $\frac{1}{4}$	:12	
4949	5		1832:17 $\frac{3}{4}$	1842:24 $\frac{3}{4}$	10:07	1842:45 $\frac{1}{2}$	:20 $\frac{3}{4}$	
4950	2		1842:55 $\frac{3}{4}$	1852:56 $\frac{3}{4}$	10:01	1853:07 $\frac{3}{4}$	:11	S
5059	4		2300:29 $\frac{1}{4}$	2309:30	9:00 $\frac{3}{4}$	2309:48 $\frac{3}{4}$	:18 $\frac{3}{4}$	
5060	5		2309:58 $\frac{1}{2}$	2318:59	9:00 $\frac{1}{2}$	2319:10	:11	
5061	1		2319:17	2328:19	9:02	2328:46	:27	
5062	2		2329:10	2335:10 $\frac{1}{2}$	6:00 $\frac{1}{2}$	2335:23 $\frac{3}{4}$	:13 $\frac{1}{4}$	S

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5081	1	1/20 (385)	0047:55 <sup>3</sup> / <sub>4</sub>	0055:55 <sup>3</sup> / <sub>4</sub>	8:00	0056:05 <sup>3</sup> / <sub>4</sub>	:10	
5082	2		0056:13 <sup>3</sup> / <sub>4</sub>	0106:27	10:13 <sup>1</sup> / <sub>4</sub>	0107:05 <sup>3</sup> / <sub>4</sub>	:38 <sup>3</sup> / <sub>4</sub>	
5083	5		0107:15	0115:19 <sup>1</sup> / <sub>4</sub>	8:04 <sup>1</sup> / <sub>4</sub>	0115:41 <sup>1</sup> / <sub>2</sub>	:22 <sup>1</sup> / <sub>4</sub>	
5152	1		1431:46 <sup>1</sup> / <sub>2</sub>	1439:47 <sup>1</sup> / <sub>2</sub>	8:01	1439:57	:09 <sup>1</sup> / <sub>2</sub>	
5153	1		1444:00 <sup>1</sup> / <sub>2</sub>	1452:02 <sup>1</sup> / <sub>2</sub>	8:02	1452:11 <sup>1</sup> / <sub>2</sub>	:09	
5154	5		1452:19 <sup>1</sup> / <sub>2</sub>	1500:05 <sup>1</sup> / <sub>2</sub>	7:46	1500:27 <sup>1</sup> / <sub>4</sub>	:21 <sup>3</sup> / <sub>4</sub>	
5155	2		1500:50 <sup>1</sup> / <sub>4</sub>	1508:12 <sup>1</sup> / <sub>4</sub>	7:22	1508:19 <sup>1</sup> / <sub>4</sub>	:07	s
5174	1		1615:40 <sup>1</sup> / <sub>4</sub>	1623:41 <sup>1</sup> / <sub>4</sub>	8:01	1632:24 <sup>1</sup> / <sub>4</sub> (S <sub>1</sub> ) 1632:33 <sup>1</sup> / <sub>4</sub> (S <sub>2</sub> )	8:43 (S <sub>1</sub> ) :09 (S <sub>2</sub> )	m
5193	2		(1805:41)	1812:51 <sup>3</sup> / <sub>4</sub>	(7:10 <sup>3</sup> / <sub>4</sub> )	1813:06 <sup>3</sup> / <sub>4</sub>	:15	s
5206	4		2049:37 <sup>1</sup> / <sub>2</sub>	2102:43 <sup>1</sup> / <sub>2</sub>	13:06	2102:56 <sup>1</sup> / <sub>2</sub>	:13	
5208	2		2112:24	2119:25 <sup>1</sup> / <sub>4</sub>	7:01 <sup>1</sup> / <sub>4</sub>	2121:04 <sup>1</sup> / <sub>4</sub>	1:39	s
5215	2		2210:58 <sup>1</sup> / <sub>4</sub>	2233:57 <sup>1</sup> / <sub>2</sub>	22:59 <sup>1</sup> / <sub>4</sub>	2234:36 <sup>1</sup> / <sub>2</sub>	:39	n
5216	5		2234:49 <sup>1</sup> / <sub>4</sub>	2244:15 <sup>1</sup> / <sub>4</sub>	9:26	2244:35 <sup>1</sup> / <sub>4</sub>	:20	
5217	1		2244:46 <sup>1</sup> / <sub>4</sub>	2252:49 <sup>1</sup> / <sub>2</sub>	8:03 <sup>1</sup> / <sub>4</sub>	2253:04 <sup>3</sup> / <sub>4</sub>	:15 <sup>1</sup> / <sub>4</sub>	
5219	4		2343:35	2353:34 <sup>1</sup> / <sub>2</sub>	9:59 <sup>1</sup> / <sub>2</sub>	2353:43 <sup>3</sup> / <sub>4</sub>	:09 <sup>1</sup> / <sub>4</sub>	s
5220	5	1/21 (386)	2353:56 <sup>1</sup> / <sub>4</sub>	0004:00	10:03 <sup>3</sup> / <sub>4</sub>	0004:14	:14	
5221	1		0004:20	0014:23	10:03	0015:04	:41	h

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5222	2		0015:09	0022:13	7:04	(0022:24)	(:11)	S
5247	4		0145:19 <sup>3</sup> / <sub>4</sub>	0153:19 <sup>3</sup> / <sub>4</sub>	8:00	0153:32 <sup>3</sup> / <sub>4</sub>	:13	
5249	5		0154:08 <sup>3</sup> / <sub>4</sub>	0200:58 <sup>1</sup> / <sub>2</sub>	6:49 <sup>3</sup> / <sub>4</sub>	0201:10 <sup>1</sup> / <sub>2</sub>	:12	
5280	4		1356:49 <sup>1</sup> / <sub>2</sub>	1406:53 <sup>1</sup> / <sub>2</sub>	10:04	1407:09 <sup>1</sup> / <sub>2</sub>	:16	
5281	5		1407:16 <sup>1</sup> / <sub>2</sub>	1417:17 <sup>1</sup> / <sub>2</sub>	10:01	1417:29 <sup>1</sup> / <sub>2</sub>	:12	
5282	2		1418:12 <sup>1</sup> / <sub>2</sub>	1426:14 <sup>1</sup> / <sub>2</sub>	8:02	1426:33 <sup>1</sup> / <sub>2</sub>	:19	S
5290	4		1515:58 <sup>1</sup> / <sub>4</sub>	1526:59 <sup>1</sup> / <sub>2</sub>	11:01 <sup>1</sup> / <sub>4</sub>	1527:14 <sup>1</sup> / <sub>2</sub>	:15	
5291	5		1527:24 <sup>1</sup> / <sub>4</sub>	1538:25 <sup>1</sup> / <sub>4</sub>	11:01	1538:32 <sup>1</sup> / <sub>4</sub>	:07	
5292	1		1538:55 <sup>1</sup> / <sub>4</sub>	1549:56 <sup>1</sup> / <sub>4</sub>	11:01	1550:13 <sup>1</sup> / <sub>4</sub>	:17	
5293	2		1550:23 <sup>1</sup> / <sub>4</sub>	1558:24 <sup>1</sup> / <sub>4</sub>	8:01	1558:40 <sup>1</sup> / <sub>4</sub>	:16	S
5330	1		1714:30 <sup>3</sup> / <sub>4</sub>	1722:31	8:00 <sup>1</sup> / <sub>4</sub>	1722:37	:06	
5331	2		1722:55	1730:55	8:00	1731:00	:05	S
5344	4		1822:39 <sup>1</sup> / <sub>4</sub>	1834:34 <sup>3</sup> / <sub>4</sub>	11:55 <sup>1</sup> / <sub>2</sub>	1834:48	:13 <sup>1</sup> / <sub>4</sub>	S
5345	5		1836:05 <sup>1</sup> / <sub>4</sub>	1848:07 <sup>3</sup> / <sub>4</sub>	12:02 <sup>1</sup> / <sub>2</sub>	1848:35 <sup>3</sup> / <sub>4</sub>	:28	
5346	1		1848:40 <sup>3</sup> / <sub>4</sub>	1900:39 <sup>3</sup> / <sub>4</sub>	11:59	1900:58 <sup>3</sup> / <sub>4</sub>	:19	
5347	2		1901:12 <sup>3</sup> / <sub>4</sub>	1907:19 <sup>3</sup> / <sub>4</sub>	6:07	1907:31 <sup>3</sup> / <sub>4</sub>	:12	S
5662	2	1/22 (387)	1606:51 <sup>3</sup> / <sub>4</sub>	1612:55 <sup>1</sup> / <sub>4</sub>	6:03 <sup>1</sup> / <sub>2</sub>	1613:01	:05 <sup>3</sup> / <sub>4</sub>	S
5690	1		2048:16 <sup>1</sup> / <sub>4</sub>	2056:15 <sup>3</sup> / <sub>4</sub>	7:59 <sup>1</sup> / <sub>2</sub>	2056:21 <sup>3</sup> / <sub>4</sub>	:06	S



TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5691	2	1/23 (388)	2056:32	2104:32 <sup>1</sup> / <sub>4</sub>	8:00 <sup>1</sup> / <sub>4</sub>	2104:38	:05 <sup>3</sup> / <sub>4</sub>	s
5692	1		2104:48 <sup>3</sup> / <sub>4</sub>	2112:48 <sup>1</sup> / <sub>4</sub>	7:59 <sup>1</sup> / <sub>2</sub>	2112:54 <sup>1</sup> / <sub>4</sub>	:06	s
5693	5		2113:05 <sup>1</sup> / <sub>4</sub>	2117:09 <sup>1</sup> / <sub>4</sub>	4:04	2117:14 <sup>1</sup> / <sub>4</sub>	:05	s
5745	1		1401:07 <sup>3</sup> / <sub>4</sub>	1401:24 <sup>1</sup> / <sub>2</sub>	:16 <sup>3</sup> / <sub>4</sub>	1405:19 <sup>3</sup> / <sub>4</sub> (S <sub>1</sub> ) 1405:34 (S <sub>2</sub> )	3:55 <sup>1</sup> / <sub>4</sub> (S <sub>1</sub> ) :14 <sup>1</sup> / <sub>4</sub> (S <sub>2</sub> )	i, s
5746	1		1405:42	1421:45 <sup>1</sup> / <sub>4</sub>	16:03 <sup>1</sup> / <sub>4</sub>	1422:02 <sup>1</sup> / <sub>4</sub>	:17	s
5747	2		1422:08 <sup>1</sup> / <sub>4</sub>	1438:09 <sup>1</sup> / <sub>4</sub>	16:01	1438:20 <sup>1</sup> / <sub>4</sub>	:11	s
5760	1		1535:53	1551:57 <sup>1</sup> / <sub>4</sub>	16:04 <sup>1</sup> / <sub>4</sub>	1552:26 <sup>3</sup> / <sub>4</sub>	:29 <sup>1</sup> / <sub>2</sub>	
5761	5		1552:34 <sup>3</sup> / <sub>4</sub>	1608:48	16:13 <sup>1</sup> / <sub>4</sub>	1609:05	:17	
5829	1		2006:34 <sup>1</sup> / <sub>4</sub>	2014:33 <sup>1</sup> / <sub>4</sub>	7:59	2014:46	:12 <sup>3</sup> / <sub>4</sub>	s
5830	4		2015:52 <sup>1</sup> / <sub>2</sub>	2023:54 <sup>1</sup> / <sub>4</sub>	8:01 <sup>3</sup> / <sub>4</sub>	2024:03 <sup>1</sup> / <sub>4</sub>	:09	s
5869	5		2148:55 <sup>3</sup> / <sub>4</sub>	2220:56 <sup>1</sup> / <sub>4</sub>	32:00 <sup>1</sup> / <sub>2</sub>	2221:17 <sup>3</sup> / <sub>4</sub>	:21 <sup>1</sup> / <sub>2</sub>	
5900	2		2347:56 <sup>3</sup> / <sub>4</sub>	2353:01 <sup>1</sup> / <sub>4</sub>	5:04 <sup>1</sup> / <sub>2</sub>	2353:07	:05 <sup>3</sup> / <sub>4</sub>	s
5901	4	1/24 (389)	2353:16	2359:44 <sup>1</sup> / <sub>2</sub>	6:28 <sup>1</sup> / <sub>2</sub>	2359:51	:06 <sup>1</sup> / <sub>2</sub>	s
5909	4		0055:20 <sup>1</sup> / <sub>2</sub>	0114:46 <sup>1</sup> / <sub>2</sub>	19:26	0115:00 <sup>1</sup> / <sub>2</sub>	:14	s
5910	5		0115:25 <sup>1</sup> / <sub>2</sub>	0130:52 <sup>1</sup> / <sub>4</sub>	15:26 <sup>3</sup> / <sub>4</sub>	0131:03 <sup>3</sup> / <sub>4</sub>	:11 <sup>1</sup> / <sub>2</sub>	
5930	5		1322:02	1336:18 <sup>1</sup> / <sub>4</sub>	14:16 <sup>1</sup> / <sub>4</sub>	1336:26 <sup>1</sup> / <sub>4</sub>	:08	
5933	4		1337:18 <sup>1</sup> / <sub>4</sub>	1353:14 <sup>1</sup> / <sub>4</sub>	15:56	1353:26 <sup>1</sup> / <sub>4</sub>	:12	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5935	1	1/25 (390)	1919:57 $\frac{1}{4}$	1927:56 $\frac{1}{2}$	7:59 $\frac{1}{4}$	1928:05 $\frac{1}{2}$	:09	
5936	2		1928:22 $\frac{1}{2}$	1936:23 $\frac{3}{4}$	8:01 $\frac{1}{4}$	1936:32 $\frac{1}{2}$	:08 $\frac{3}{4}$	S
5937	4		1936:47 $\frac{1}{4}$	1944:49 $\frac{1}{4}$	8:02	1944:57 $\frac{1}{4}$	:08	S
5938	5		1945:28 $\frac{1}{4}$	2005:31 $\frac{1}{4}$	20:03	2005:41 $\frac{1}{4}$	:10	
6019	1		1406:24 $\frac{1}{4}$	1417:26 $\frac{3}{4}$	11:02 $\frac{1}{2}$	1417:37 $\frac{1}{4}$	:10 $\frac{1}{2}$	
6020	2		1419:44 $\frac{1}{4}$	1430:47	11:02 $\frac{3}{4}$	1431:43	:56	
6021	5		1436:43	1448:34 $\frac{3}{4}$	11:51 $\frac{3}{4}$	1448:43 $\frac{3}{4}$	:09	
6023	1	1/26 (391)	1840:39 $\frac{1}{4}$	1848:40 $\frac{1}{2}$	8:01 $\frac{1}{4}$	1848:48 $\frac{1}{4}$	:07 $\frac{3}{4}$	
6024	2		1849:09 $\frac{1}{2}$	1857:08 $\frac{1}{2}$	7:59	1857:15	:06 $\frac{1}{2}$	S
6131	2		1501:48 $\frac{1}{4}$	1506:48 $\frac{1}{4}$	5:00	1506:56 $\frac{1}{4}$	:08	S
6132	2		1508:02 $\frac{1}{2}$	1513:02	4:59 $\frac{1}{2}$	1513:10 $\frac{3}{4}$	:08 $\frac{3}{4}$	S
6133	2		1515:34	1520:36 $\frac{1}{4}$	5:02 $\frac{1}{4}$	1520:54	:17 $\frac{3}{4}$	S
6134	2		1522:32 $\frac{1}{4}$	1527:34 $\frac{1}{2}$	5:05 $\frac{1}{4}$	1527:54 $\frac{1}{2}$	:20	S
6135	2		1528:52 $\frac{1}{2}$	1533:53 $\frac{1}{2}$	5:01	1534:12 $\frac{1}{2}$	:19	S
6136	2		1535:02 $\frac{1}{2}$	1540:02 $\frac{1}{2}$	5:00	1540:12 $\frac{1}{2}$	:10	S
6155	5		(2120:26 $\frac{1}{2}$ )	2154:29 $\frac{1}{2}$	(34:03)	2154:45 $\frac{1}{2}$	:16	
6163	4		2309:38 $\frac{1}{4}$	2328:15 $\frac{1}{4}$	18:37	2328:26 $\frac{1}{4}$	:11	
6170	4	1/27 (392)	0026:38	0040:51 $\frac{1}{4}$	14:13 $\frac{1}{4}$	(0041:00 $\frac{3}{4}$ )	(:09 $\frac{1}{2}$ )	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
6171	5		0042:17	0100:30 <sup>3</sup> / <sub>4</sub>	18:13 <sup>3</sup> / <sub>4</sub>	0101:24	:53 <sup>1</sup> / <sub>4</sub>	
6172	5		0141:52 <sup>3</sup> / <sub>4</sub>	0230:47 <sup>1</sup> / <sub>2</sub>	48:54 <sup>3</sup> / <sub>4</sub>	0231:05 <sup>1</sup> / <sub>2</sub>	:18	
6191	4		1448:33 <sup>1</sup> / <sub>2</sub>	1455:14 <sup>1</sup> / <sub>2</sub>	6:41	1455:23 <sup>1</sup> / <sub>2</sub>	:09	
6198	1		2213:11	2221:14	8:03	2221:26	:12	
6199	5		2221:57	2230:01	8:04	2230:17	:16	
6228	2		2350:58 <sup>3</sup> / <sub>4</sub>	2355:59 <sup>3</sup> / <sub>4</sub>	5:01	2356:05 <sup>3</sup> / <sub>4</sub>	:06	
6229	5		2356:27 <sup>3</sup> / <sub>4</sub>	0007:27 <sup>3</sup> / <sub>4</sub>	11:00	0007:33 <sup>3</sup> / <sub>4</sub>	:06	
6254	2	1/28 (393)	1205:51 <sup>1</sup> / <sub>2</sub>	1216:51 <sup>3</sup> / <sub>4</sub>	11:00 <sup>1</sup> / <sub>4</sub>	1216:58 <sup>3</sup> / <sub>4</sub>	:07	
6523	5	1/29 (394)	1420:50 <sup>1</sup> / <sub>2</sub>	1431:49 <sup>3</sup> / <sub>4</sub>	10:59 <sup>1</sup> / <sub>4</sub>	1432:04 <sup>1</sup> / <sub>2</sub>	:14 <sup>3</sup> / <sub>4</sub>	
6525	4		1440:06	1444:05 <sup>1</sup> / <sub>4</sub>	3:59 <sup>1</sup> / <sub>4</sub>	1444:17 <sup>3</sup> / <sub>4</sub>	:12 <sup>1</sup> / <sub>2</sub>	
6526	5		1444:24 <sup>1</sup> / <sub>4</sub>	1457:06 <sup>1</sup> / <sub>4</sub>	12:42	1457:29 <sup>1</sup> / <sub>4</sub>	:23	
6527	1		1457:36 <sup>1</sup> / <sub>4</sub>	1502:39 <sup>1</sup> / <sub>4</sub>	5:03	1502:57 <sup>1</sup> / <sub>4</sub>	:18	
6552	4		2242:12 <sup>3</sup> / <sub>4</sub>	2254:00 <sup>1</sup> / <sub>2</sub>	11:47 <sup>3</sup> / <sub>4</sub>	2256:38 <sup>3</sup> / <sub>4</sub>	2:38 <sup>1</sup> / <sub>4</sub>	
6553	2	1/30 (395)	0025:45	0025:54 <sup>3</sup> / <sub>4</sub>	:09 <sup>3</sup> / <sub>4</sub>	0056:06 <sup>1</sup> / <sub>2</sub> (S <sub>1</sub> ) 0057:13 <sup>1</sup> / <sub>2</sub> (S <sub>2</sub> ) 0057:21 <sup>1</sup> / <sub>2</sub> (S <sub>3</sub> )	31:11 <sup>3</sup> / <sub>4</sub> (S <sub>1</sub> ) :07 (S <sub>2</sub> ) :08 (S <sub>3</sub> )	o
6572	5		1401:55	1428:09 <sup>1</sup> / <sub>4</sub>	26:14 <sup>1</sup> / <sub>4</sub>	1428:52 <sup>3</sup> / <sub>4</sub>	:43 <sup>1</sup> / <sub>2</sub>	
6574	1		2006:28 <sup>1</sup> / <sub>2</sub>	2014:28 <sup>1</sup> / <sub>4</sub>	7:59 <sup>3</sup> / <sub>4</sub>	2014:34 <sup>1</sup> / <sub>4</sub>	:06	
6575	5		2014:45 <sup>1</sup> / <sub>4</sub>	2022:48 <sup>1</sup> / <sub>4</sub>	8:03	2022:55 <sup>1</sup> / <sub>4</sub>	:07	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
6642	5	1/31 (396)	1930:57 $\frac{1}{4}$	1956:00	25:02 $\frac{3}{4}$	1956:10	:10	o
6643	3	2/1 (397)	1327:10 $\frac{1}{4}$	1327:13 $\frac{1}{4}$	:03	1338:06 (S <sub>1</sub> ) 1338:20 (S <sub>2</sub> ) 1342:20 $\frac{1}{4}$ (S <sub>3</sub> )	10:52 $\frac{3}{4}$ (S <sub>1</sub> ) :14 (S <sub>2</sub> ) 4:00 $\frac{1}{4}$ (S <sub>3</sub> )	
6685	1		2313:49 $\frac{1}{2}$	2319:13 $\frac{1}{2}$	5:24	2319:22 $\frac{1}{2}$	:09	
6686	5		2319:34 $\frac{1}{2}$	2329:14 $\frac{1}{2}$	9:40	2329:25 $\frac{1}{2}$	:11	
6688	4		2337:51 $\frac{1}{2}$	2346:40 $\frac{1}{2}$	8:49	2346:46 $\frac{1}{2}$	:06	
6706	1	2/3 (399)	0135:20	0141:15 $\frac{3}{4}$	5:55 $\frac{3}{4}$	0141:22 $\frac{3}{4}$	:07	
6707	5		(0141:45 $\frac{1}{2}$ )	0153:54 $\frac{3}{4}$	(12:09 $\frac{1}{4}$ )	0153:59 $\frac{3}{4}$	:05	

- a. Multiple secondaries; i. e., P + S<sub>1</sub> + S<sub>2</sub>. Filter changed in S<sub>1</sub> (to Fil. 2). Also, repointed in S<sub>1</sub> and S<sub>2</sub>.
- b. Pad shows S<sup>L</sup>3 20:00, SS(400K) 0026.
- c. Telemetry data noisy. Pad shows S<sup>L</sup>3 13:00.
- d. Pad shows S<sup>L</sup>2 8:00, S<sup>L</sup>1 7:00, S<sup>L</sup>4 7:00, S<sup>L</sup>5 7:00, SS(400K) 1614. Repointed in S.
- e. Repointed in S.
- f. Filter changed in S (appears to have been cycled from 1 to 1).
- g. Telemetry data noisy. Pas shows S<sup>L</sup>1 10:00, S<sup>L</sup>5 10:00, SS(400K) 1516).
- h. Filter changed in S.
- i. Multiple secondaries; i. e., P + S<sub>1</sub> + S<sub>2</sub>.

TABLE 3. (Concluded)

- j. Telemetry data noisy. Pad shows no  $S^L$  operations scheduled. SS (400K) 2140.
- k. Multiple secondaries; i.e.,  $P + S_1 + S_2$ . Filter changed in  $S_1$ . Repointed in  $S_1$ . Pad shows  $S^{L5}$  8:00,  $S^{L1}$  8:00,  $S^{L4}$  8:00,  $S^{L2}$  8:00, SS 2034.
- l. Multiple secondaries; i.e.,  $P + S_1 + S_2$ . Repointed in  $S_1$ .
- m. Multiple secondaries; i.e.,  $P + S_1 + S_2$ . Filter changed in  $S_1$ .
- n. Filter changed in P.
- o. Multiple secondaries; i.e.,  $P + S_1 + S_2 + S_3$ .
- s. Stepped-image frame.

TABLE 4. SL4 LOAD 5 (COLOR) SUPER-LONG ( $s^L$ ) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
115	4	11/27/73 (331)	2159:01	2207:05	8:04	2207:43	:38	
122	5		2215:39 $\frac{3}{4}$	2224:18 $\frac{1}{2}$	8:38 $\frac{3}{4}$	2225:10 $\frac{1}{2}$	:52	
186	4	11/28 (332)	0226:52	0238:54 $\frac{1}{2}$	12:02 $\frac{1}{2}$	0240:10	1:15 $\frac{1}{2}$	
282	4		2232:21 $\frac{1}{2}$	2244:22 $\frac{1}{4}$	12:00 $\frac{3}{4}$	2244:34 $\frac{1}{4}$	:12	
283	2		2245:33 $\frac{3}{4}$	2250:42 $\frac{1}{2}$	5:08 $\frac{3}{4}$	2250:53 $\frac{1}{4}$	:10 $\frac{3}{4}$	
284	1		2251:36 $\frac{1}{2}$	2302:37 $\frac{1}{2}$	11:01	2302:47 $\frac{1}{2}$	:10	
297	4	11/29 (333)	0145:56	0157:58	12:02	0158:07	:09	
461	2		2026:41 $\frac{1}{2}$	2031:42 $\frac{1}{4}$	5:00 $\frac{3}{4}$	2032:00 $\frac{1}{2}$	:18 $\frac{1}{4}$	
462	1		2033:00 $\frac{3}{4}$	2041:02	8:01 $\frac{1}{4}$	2041:13	:11	
548	4	11/30 (334)	0245:26	0258:32	13:06	0258:39	:07	
573	2		1522:31 $\frac{3}{4}$	1528:02	5:30 $\frac{1}{4}$	1528:14	:12	
581	4	12/1 (335)	0207:12 $\frac{1}{2}$	0219:17	12:04 $\frac{1}{2}$	(0234:19 $\frac{1}{2}$ )	(15:02 $\frac{1}{2}$ )	a, b, c
607	1		(2218:47 $\frac{1}{2}$ )	2231:50 $\frac{1}{4}$	(13:02 $\frac{3}{4}$ )	2231:59 $\frac{1}{4}$	:09	
608	2		2236:37 $\frac{1}{4}$	2242:37 $\frac{1}{2}$	6:00 $\frac{1}{4}$	2242:45 $\frac{1}{2}$	:08	
645	4	12/2 (336)	(0250:38 $\frac{1}{2}$ )	0303:43 $\frac{1}{2}$	(13:05)	(0307:40 $\frac{3}{4}$ )	(3:57 $\frac{1}{4}$ )	d, s
902	4	12/3 (337)	0211:52	0223:51 $\frac{1}{2}$	11:59 $\frac{1}{2}$	0224:01 $\frac{1}{2}$	:10	
933	2		1640:14 $\frac{1}{4}$	1644:49 $\frac{1}{4}$	4:35	1645:02 $\frac{1}{4}$	:13	
934	2		1805:02 $\frac{1}{2}$	1810:13 $\frac{3}{4}$	5:11 $\frac{1}{4}$	1810:24 $\frac{3}{4}$	:11	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
935	4	12/4 (338)	1811:19 <sup>3</sup> / <sub>4</sub>	1817:24 <sup>3</sup> / <sub>4</sub>	6:05	1817:35 <sup>3</sup> / <sub>4</sub>	:11	e
966	2		1944:15 <sup>1</sup> / <sub>2</sub>	1950:43 <sup>1</sup> / <sub>2</sub>	6:28	1950:55 <sup>1</sup> / <sub>2</sub>	:12	
967	4		2037:42 <sup>1</sup> / <sub>4</sub>	2045:54 <sup>3</sup> / <sub>4</sub>	8:12 <sup>1</sup> / <sub>2</sub>	2046:03	:08 <sup>1</sup> / <sub>4</sub>	
968	1		2046:25 <sup>1</sup> / <sub>2</sub>	2054:25 <sup>1</sup> / <sub>4</sub>	7:59 <sup>3</sup> / <sub>4</sub>	2054:33 <sup>1</sup> / <sub>4</sub>	:08	
969	4		2210:04	2223:22 <sup>1</sup> / <sub>4</sub>	13:18 <sup>1</sup> / <sub>4</sub>	2223:57 <sup>1</sup> / <sub>4</sub>	:35	
970	5		2235:21	2256:12 <sup>3</sup> / <sub>4</sub>	20:51 <sup>3</sup> / <sub>4</sub>	2256:22 <sup>1</sup> / <sub>4</sub>	:09 <sup>1</sup> / <sub>2</sub>	
971	4		2341:55 <sup>3</sup> / <sub>4</sub>	2349:55 <sup>1</sup> / <sub>2</sub>	7:59 <sup>3</sup> / <sub>4</sub>	2350:02 <sup>1</sup> / <sub>4</sub>	:06 <sup>3</sup> / <sub>4</sub>	
972	1		2350:20	2358:24 <sup>3</sup> / <sub>4</sub>	8:04 <sup>3</sup> / <sub>4</sub>	2358:31 <sup>3</sup> / <sub>4</sub>	:07	
1063	4		0325:00 <sup>1</sup> / <sub>1</sub>	0335:10 <sup>1</sup> / <sub>4</sub>	10:10	(0335:16)	(:06)	
1088	2		1730:36 <sup>3</sup> / <sub>4</sub>	1735:40 <sup>3</sup> / <sub>4</sub>	5:04	1735:53 <sup>3</sup> / <sub>4</sub>	:13	
1095	1		1829:48 <sup>1</sup> / <sub>4</sub>	1842:01 <sup>1</sup> / <sub>2</sub>	12:13 <sup>1</sup> / <sub>4</sub>	1842:11 <sup>1</sup> / <sub>2</sub>	:10	
1096	4		1843:01 <sup>1</sup> / <sub>2</sub>	1855:00	11:58 <sup>1</sup> / <sub>2</sub>	1855:14	:14	
1097	5		1855:33	1908:59 <sup>1</sup> / <sub>2</sub>	13:26 <sup>1</sup> / <sub>2</sub>	1909:13 <sup>1</sup> / <sub>2</sub>	:14	
1098	1		1954:52 <sup>1</sup> / <sub>4</sub>	2006:51 <sup>1</sup> / <sub>4</sub>	11:59	2007:02 <sup>1</sup> / <sub>2</sub>	:11 <sup>1</sup> / <sub>4</sub>	
1099	5		(2007:38)	2019:43 <sup>1</sup> / <sub>4</sub>	(12:05 <sup>1</sup> / <sub>4</sub> )	2019:53 <sup>1</sup> / <sub>4</sub>	:10	
1246	2	12/5 (339)	1440:26 <sup>1</sup> / <sub>4</sub>	1445:24 <sup>1</sup> / <sub>2</sub>	4:58 <sup>1</sup> / <sub>4</sub>	1445:38 <sup>3</sup> / <sub>4</sub>	:14 <sup>1</sup> / <sub>4</sub>	
1253	2		1649:58 <sup>3</sup> / <sub>4</sub>	1653:57 <sup>3</sup> / <sub>4</sub>	3:59	1654:07 <sup>3</sup> / <sub>4</sub>	:10	
1261	1		1748:10 <sup>3</sup> / <sub>4</sub>	1758:12 <sup>1</sup> / <sub>2</sub>	10:01 <sup>3</sup> / <sub>4</sub>	1758:26 <sup>1</sup> / <sub>2</sub>	:14	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1262	4	12/6 (340)	1806:59 <sup>3</sup> / <sub>4</sub>	1816:58 <sup>1</sup> / <sub>4</sub>	9:58 <sup>1</sup> / <sub>2</sub>	1817:06 <sup>3</sup> / <sub>4</sub>	:08 <sup>1</sup> / <sub>2</sub>	
1263	5		1818:09 <sup>1</sup> / <sub>2</sub>	1827:20 <sup>1</sup> / <sub>2</sub>	9:11	1827:33 <sup>1</sup> / <sub>2</sub>	:13	
1366	5		0202:42	0213:13	10:31	0213:28	:15	
1415	1		1658:39 <sup>1</sup> / <sub>2</sub>	1711:39 <sup>1</sup> / <sub>4</sub>	12:59 <sup>3</sup> / <sub>4</sub>	1711:47	:07 <sup>3</sup> / <sub>4</sub>	
1428	4		1719:16 <sup>1</sup> / <sub>2</sub>	1731:19 <sup>1</sup> / <sub>2</sub>	12:03	1731:27 <sup>3</sup> / <sub>4</sub>	:08 <sup>1</sup> / <sub>4</sub>	
1435	1		1737:08 <sup>1</sup> / <sub>2</sub>	1745:01 <sup>1</sup> / <sub>2</sub>	7:53	1745:08 <sup>1</sup> / <sub>2</sub>	:07	
1442	1		1855:46 <sup>1</sup> / <sub>4</sub>	1915:46 <sup>1</sup> / <sub>4</sub>	20:00	1915:57 <sup>1</sup> / <sub>4</sub>	:11	
1449	1		2026:58	2034:58	8:00	2035:10	:12	
1450	4		(2041:04 <sup>1</sup> / <sub>2</sub> )	2049:04	(7:59 <sup>1</sup> / <sub>2</sub> )	2050:48	1:44	
1451	5		2051:09	2052:14	1:05	2052:30	:16	
1458	1		2153:27 <sup>1</sup> / <sub>4</sub>	2201:33 <sup>3</sup> / <sub>4</sub>	8:06 <sup>1</sup> / <sub>2</sub>	2201:50 <sup>3</sup> / <sub>4</sub>	:17	
1459	4		2207:07 <sup>3</sup> / <sub>4</sub>	2215:11 <sup>3</sup> / <sub>4</sub>	8:04	2215:29 <sup>3</sup> / <sub>4</sub>	:18	
1460	5		2217:23	2225:21 <sup>3</sup> / <sub>4</sub>	7:48 <sup>3</sup> / <sub>4</sub>	2225:34 <sup>3</sup> / <sub>4</sub>	:13	
1486	2	12/7 (341)	0126:29 <sup>1</sup> / <sub>4</sub>	0131:49 <sup>1</sup> / <sub>4</sub>	5:20	0132:05 <sup>1</sup> / <sub>4</sub>	:16	
1495	1		1522:22 <sup>3</sup> / <sub>4</sub>	1530:50 <sup>3</sup> / <sub>4</sub>	8:28	1531:06 <sup>3</sup> / <sub>4</sub>	:16	
1502	1		1620:51	1628:50 <sup>3</sup> / <sub>4</sub>	7:59 <sup>3</sup> / <sub>4</sub>	1629:07	:16 <sup>1</sup> / <sub>4</sub>	
1503	4		1632:30 <sup>1</sup> / <sub>2</sub>	1640:29 <sup>3</sup> / <sub>4</sub>	7:59 <sup>1</sup> / <sub>4</sub>	1640:42 <sup>3</sup> / <sub>4</sub>	:13	
1504	5		1644:10 <sup>1</sup> / <sub>2</sub>	1652:10 <sup>1</sup> / <sub>2</sub>	8:00	1652:27 <sup>1</sup> / <sub>2</sub>	:17	



TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1505	2	12/8 (342)	1654:13 $\frac{1}{2}$	1701:13 $\frac{1}{2}$	7:00	1701:25 $\frac{1}{2}$	:12	
1518	4		1907:02 $\frac{1}{4}$	1927:05 $\frac{1}{4}$	20:03	1927:18 $\frac{1}{4}$	:13	
1539	5		(2127:23)	2135:22 $\frac{1}{2}$	(7:59 $\frac{1}{2}$ )	2135:31	:08 $\frac{1}{2}$	
1576	4		2308:31 $\frac{1}{4}$	2316:30 $\frac{1}{4}$	7:59	2316:38	:07 $\frac{3}{4}$	
1595	5		0207:19 $\frac{3}{4}$	0223:20 $\frac{3}{4}$	16:01	2330:00 $\frac{3}{4}$	:10	
1626	1		1415:30 $\frac{3}{4}$	1423:33 $\frac{1}{4}$	8:02 $\frac{1}{2}$	1423:48 $\frac{1}{2}$	:15 $\frac{1}{4}$	
1627	2		1423:58 $\frac{3}{4}$	1431:01 $\frac{3}{4}$	7:03	1431:17 $\frac{3}{4}$	:16	
1628	4		1431:29 $\frac{3}{4}$	1440:30 $\frac{3}{4}$	9:01	1440:53 $\frac{3}{4}$	:23	
1629	5		1440:58 $\frac{3}{4}$	1449:19 $\frac{3}{4}$	8:21	1450:10 $\frac{3}{4}$	:51	
1650	2		1910:52 $\frac{3}{4}$	1916:46 $\frac{1}{4}$	5:53 $\frac{1}{2}$	1917:03 $\frac{3}{4}$	:17 $\frac{1}{2}$	
1651	4	12/9 (343)	1917:31 $\frac{3}{4}$	1927:46 $\frac{3}{4}$	10:15	1928:03 $\frac{3}{4}$	:17	
1682	1		2046:20 $\frac{1}{2}$	2056:17	9:56 $\frac{1}{2}$	2056:25 $\frac{3}{4}$	:08 $\frac{3}{4}$	
1733	1		1647:32 $\frac{1}{4}$	1652:31 $\frac{1}{4}$	4:59	1652:39 $\frac{1}{2}$	:08 $\frac{1}{4}$	
1734	2		1656:47 $\frac{1}{4}$	1701:43 $\frac{1}{4}$	4:56	1701:54 $\frac{1}{4}$	:11	
1735	4		1705:30	1710:30	5:00	1710:39	:09	
1736	5		1710:47	1717:45	6:58	1718:24	:39	
1745	1		1809:19	1814:18	4:59	1814:28	:10	
1746	2		1815:30	1820:31	5:01	1820:39	:08	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1747	4	12/10 (344)	1821:38	1826:38	5:00	1826:45	:07	f, g
1748	5		1827:50 $\frac{1}{4}$	1832:53 $\frac{1}{2}$	5:03 $\frac{1}{4}$	1833:00 $\frac{3}{4}$	:07 $\frac{1}{4}$	
1749	5		1837:59	?	?	(1848:32)	?	
1756	1		1953:11 $\frac{3}{4}$	1957:11 $\frac{3}{4}$	4:00	1957:23 $\frac{3}{4}$	:12	
1757	4		2000:06 $\frac{3}{4}$	2008:11	8:04 $\frac{1}{4}$	2008:25 $\frac{1}{4}$	:14 $\frac{1}{4}$	
1758	5		2009:39 $\frac{3}{4}$	2020:45 $\frac{1}{2}$	11:05 $\frac{3}{4}$	2020:59 $\frac{1}{2}$	:14	
1765	2		2146:43 $\frac{1}{4}$	2154:04 $\frac{1}{2}$	7:21 $\frac{1}{4}$	2154:16 $\frac{1}{4}$	:11 $\frac{3}{4}$	
1824	2		1921:34 $\frac{3}{4}$	1930:37	9:02 $\frac{1}{4}$	1931:18 $\frac{1}{2}$	:11 $\frac{1}{2}$	
1825	5		1934:29 $\frac{3}{4}$	1939:49 $\frac{3}{4}$	5:20	1940:02 $\frac{3}{4}$	:13	
1863	5		2105:50	2112:31 $\frac{1}{2}$	6:41 $\frac{1}{2}$	2113:17 $\frac{1}{2}$	:46	
1888	1	12/11 (345)	2234:08 $\frac{1}{4}$	2244:02	9:53 $\frac{3}{4}$	2244:15	:13	a, h
1925	2		2359:59	0007:39	7:40	(0014:23 $\frac{1}{4}$ )	(6:44 $\frac{1}{4}$ )	
1980	2		1708:19 $\frac{1}{2}$	1718:18 $\frac{3}{4}$	9:59 $\frac{1}{4}$	1718:28 $\frac{3}{4}$	:10	
2011	1		1842:54 $\frac{1}{4}$	1856:10 $\frac{1}{2}$	13:16 $\frac{1}{4}$	1856:23 $\frac{1}{2}$	:13	
2042	5		2020:28 $\frac{3}{4}$	2031:15 $\frac{1}{4}$	10:46 $\frac{1}{2}$	2031:24 $\frac{3}{4}$	:09 $\frac{1}{2}$	
2055	2		2146:58	2154:56 $\frac{3}{4}$	7:58 $\frac{3}{4}$	2155:04 $\frac{3}{4}$	:08	
2056	1		2155:24 $\frac{3}{4}$	2203:24 $\frac{1}{2}$	7:59 $\frac{3}{4}$	2203:31 $\frac{3}{4}$	:07 $\frac{1}{4}$	
2069	2		2300:50 $\frac{3}{4}$	2308:50 $\frac{3}{4}$	8:00	2309:07 $\frac{3}{4}$	:17	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
2070	4	12/12 (346)	2310:00 <sup>3</sup> / <sub>4</sub>	2317:59 <sup>3</sup> / <sub>4</sub>	7:59	2318:26 <sup>3</sup> / <sub>4</sub>	:27	
2071	2		2319:01 <sup>3</sup> / <sub>4</sub>	2327:02 <sup>3</sup> / <sub>4</sub>	8:01	2327:32 <sup>3</sup> / <sub>4</sub>	:30	
2072	5		2327:42 <sup>3</sup> / <sub>4</sub>	2335:42 <sup>1</sup> / <sub>4</sub>	7:59 <sup>1</sup> / <sub>2</sub>	2335:58 <sup>3</sup> / <sub>4</sub>	:16 <sup>1</sup> / <sub>2</sub>	
2135	4		0231:25 <sup>1</sup> / <sub>4</sub>	0239:25 <sup>1</sup> / <sub>4</sub>	8:00	0239:43 <sup>1</sup> / <sub>4</sub>	:18	
2136	5		0239:53 <sup>1</sup> / <sub>4</sub>	0244:51 <sup>1</sup> / <sub>4</sub>	4:58	0245:07 <sup>1</sup> / <sub>4</sub>	:16	
2156	2		0405:33	0410:13	4:40	0410:20	:07	
2157	2		0412:04	0417:03	4:59	0417:09	:06	
2536	2	12/14 (348)	0103:48 <sup>1</sup> / <sub>4</sub>	0112:32 <sup>1</sup> / <sub>4</sub>	8:44	0112:47 <sup>1</sup> / <sub>4</sub>	:15	
2543	4		0236:41	0244:41	8:00	0244:57	:16	
2544	5		0249:59	0256:17	6:18	0256:33	:16	
2575	1		1443:57	1453:55 <sup>1</sup> / <sub>4</sub>	9:58 <sup>1</sup> / <sub>4</sub>	1454:01 <sup>1</sup> / <sub>4</sub>	:06	
2576	4		1458:02	1503:01	4:59	1503:10	:09	
2577	2		1506:41	1511:40	4:59	1511:48	:08	
2596	4		1640:39 <sup>3</sup> / <sub>4</sub>	1647:10 <sup>3</sup> / <sub>4</sub>	6:31	1647:26 <sup>3</sup> / <sub>4</sub>	:16	
2597	5		1649:30 <sup>3</sup> / <sub>4</sub>	1655:31 <sup>3</sup> / <sub>4</sub>	6:01	1655:47 <sup>3</sup> / <sub>4</sub>	:16	
2623	4		1811:08 <sup>1</sup> / <sub>2</sub>	1819:08 <sup>1</sup> / <sub>4</sub>	7:59 <sup>3</sup> / <sub>4</sub>	1819:20 <sup>1</sup> / <sub>4</sub>	:12	
2660	2		1956:38	2001:24 <sup>1</sup> / <sub>4</sub>	4:46 <sup>1</sup> / <sub>4</sub>	2001:41 <sup>1</sup> / <sub>4</sub>	:17	
2715	4		2221:17	2227:16	5:59	2227:27 <sup>1</sup> / <sub>4</sub>	:11 <sup>1</sup> / <sub>4</sub>	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. )P)	STOP (S)	EXP. (S)	Comments
2812	2	12/15 (349)	1552:15	1557:16	5:01	1557:24	:08	
2813	4		1558:26	1601:54	3:28	1602:02	:08	
2838	2		1718:38 $\frac{3}{4}$	1723:42 $\frac{3}{4}$	5:04	1723:55 $\frac{3}{4}$	:13	
2839	4		1724:19 $\frac{3}{4}$	1732:19 $\frac{1}{4}$	7:59 $\frac{1}{2}$	1733:13 $\frac{1}{4}$	:54	
2840	5		1733:21 $\frac{1}{2}$	1736:36 $\frac{3}{4}$	3:15 $\frac{1}{4}$	1736:53 $\frac{3}{4}$	:15	
2841	5		1739:44 $\frac{3}{4}$	1747:39 $\frac{3}{4}$	7:55	1748:00 $\frac{3}{4}$	:21	
2854	4		1859:20 $\frac{1}{2}$	1907:24 $\frac{1}{4}$	8:03 $\frac{3}{4}$	1907:42	:17 $\frac{3}{4}$	
2929	5	12/16 (350)	(1323:31 $\frac{1}{4}$ )	1331:31 $\frac{1}{4}$	(8:00)	1333:27 $\frac{1}{4}$	:56	s a, i, s
2973	1		1626:15	1633:14 $\frac{3}{4}$	6:59 $\frac{3}{4}$	1633:26 $\frac{3}{4}$	:12	
2974	2		1633:58 $\frac{3}{4}$	1639:05 $\frac{3}{4}$	5:07	1647:19 $\frac{1}{2}$ (S <sub>1</sub> ) 1647:37 $\frac{3}{4}$ (S <sub>2</sub> )	8:13 $\frac{3}{4}$ (S <sub>1</sub> ) :18 $\frac{1}{4}$ (S <sub>2</sub> )	
3465	2	12/17 (351)	2020:25 $\frac{1}{4}$	2033:44	13:18 $\frac{3}{4}$	2034:04	:20	
3534	2		2327:19 $\frac{3}{4}$	2333:21	6:01 $\frac{1}{4}$	2333:56 $\frac{1}{4}$	:35 $\frac{1}{4}$	
3535	5		2334:48 $\frac{1}{4}$	2340:49	6:01 $\frac{3}{4}$	2341:30	:41	
3536	4		2358:18 $\frac{1}{2}$	0006:19 $\frac{1}{2}$	8:01	0007:38 $\frac{1}{2}$	1:19	
3537	5	12/18 (352)	0007:44 $\frac{1}{2}$	0013:19 $\frac{1}{4}$	5:34 $\frac{3}{4}$	0013:32 $\frac{1}{4}$	:13	
3581	2		1407:10	1412:10	5:00	1412:23	:13	
3588	2		1639:06 $\frac{1}{2}$	1644:05 $\frac{1}{2}$	4:59	1644:19 $\frac{1}{2}$	:14	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
3595	4	12/19 (353)	1703:20 $\frac{1}{2}$	1710:28	7:07 $\frac{1}{2}$	1710:42 $\frac{3}{4}$	:14 $\frac{3}{4}$	s
3596	5		1711:10 $\frac{3}{4}$	1719:12 $\frac{1}{2}$	8:01 $\frac{3}{4}$	1719:26 $\frac{1}{2}$	:14	
3711	5		0018:13 $\frac{1}{4}$	0030:11 $\frac{3}{4}$	11:58 $\frac{1}{2}$	0030:20 $\frac{1}{2}$	:08 $\frac{3}{4}$	
3712	1		0030:45 $\frac{3}{4}$	0035:46 $\frac{1}{4}$	5:00 $\frac{1}{2}$	0035:54	:07 $\frac{3}{4}$	
3713	2		0036:30	0042:31	6:01	(0042:40 $\frac{1}{4}$ )	(:09 $\frac{1}{4}$ )	j
3738	1	12/20 (354)	0216:05 $\frac{3}{4}$	0221:36 $\frac{3}{4}$	5:31	0221:48 $\frac{3}{4}$	:12	
3909	4		0149:16	0154:47	5:31	0154:56	:09	
3934	5		1518:36 $\frac{3}{4}$	1525:37 $\frac{1}{2}$	7:00 $\frac{3}{4}$	(1533:39)	(8:01 $\frac{1}{2}$ )	a,k
3935	4		1535:33 $\frac{3}{4}$	1540:32 $\frac{3}{4}$	4:59	1540:44 $\frac{3}{4}$	:12	
3936	2		1541:20 $\frac{3}{4}$	1546:20 $\frac{3}{4}$	5:00	1546:27 $\frac{3}{4}$	:07	
3937	5		1639:41 $\frac{3}{4}$	1646:39 $\frac{3}{4}$	6:58	1646:46 $\frac{3}{4}$	:07	
3938	1		1646:56 $\frac{3}{4}$	1653:57 $\frac{1}{2}$	7:00 $\frac{3}{4}$	1654:05 $\frac{1}{2}$	:08	
3964	4		1841:50	1848:03	6:13	1848:13	:10	
3965	5		1848:19	1854:40 $\frac{1}{2}$	6:21 $\frac{1}{2}$	1855:37 $\frac{3}{4}$	:57 $\frac{1}{4}$	
4155	3	12/21 (355)	1728:59 $\frac{1}{4}$	1806:18 $\frac{1}{4}$	37:19	1806:30 $\frac{1}{4}$	:12	
4864	2	12/23 (357)	1341:11	1349:12	8:01	1349:22	:10	
4865	5		1349:28	1352:46	3:18	1352:54	:08	
4891	3		1911:10 $\frac{1}{4}$	1926:18 $\frac{3}{4}$	15:08 $\frac{1}{2}$	1926:29 $\frac{3}{4}$	:11	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
4892	4	12/24 (358)	1934:41 $\frac{3}{4}$	2001:03 $\frac{3}{4}$	6:22	2001:20 $\frac{3}{4}$	:17	
4894	3		2050:45 $\frac{1}{4}$	2114:03 $\frac{1}{2}$	23:18 $\frac{1}{4}$	2114:13 $\frac{1}{2}$	:10	
4895	1		2122:13 $\frac{1}{2}$	2134:14	12:00 $\frac{1}{2}$	2134:34	:20	
4914	5		1355:18 $\frac{3}{4}$	1355:56 $\frac{3}{4}$	:38	1356:02 $\frac{3}{4}$	:06	
4915	5		1356:18 $\frac{3}{4}$	1406:23 $\frac{3}{4}$	10:05	1406:31 $\frac{3}{4}$	:08	
4934	1		1438:17 $\frac{1}{2}$	1446:16 $\frac{1}{2}$	7:59	1446:24 $\frac{1}{2}$	:08	
4997	3		1833:13 $\frac{3}{4}$	1858:11	24:57 $\frac{1}{4}$	1858:26	:15	
4998	4		1902:02	1912:26	10:24	(1913:29 $\frac{3}{4}$ )	(1:03 $\frac{3}{4}$ )	1
4999	3		2008:19	2049:40 $\frac{1}{2}$	41:21 $\frac{1}{2}$	2054:27 $\frac{3}{4}$	4:47 $\frac{1}{4}$	

- a. Multiple secondaries; i.e.,  $P + S_1 + S_2$ .
- b. "ATM Schedule Pad" (Pad) shows:  $S^L_4$  12:00,  $S^L_1$  10:00,  $S^L_2$  5:00, SS 0235.
- c. STOP(S) entry could be either (0226:19 $\frac{1}{2}$ ) or (0234:19 $\frac{1}{2}$ ) implying EXP. (S) to be either (7:02 $\frac{1}{2}$ ) or (15:02 $\frac{1}{2}$ ), respectively.
- d. Pad shows:  $S^L_4$  12:00, SS 0327.
- e. Pad shows:  $S^L_2$  6:00, SS 0337.
- f. Pad shows:  $S^L_1$  5:00,  $S^L_2$  5:00,  $S^L_4$  5:00,  $S^L_5$  continue to 40K, SS(400K) 1848. Telemetry data noisy.
- g. STOP(S) entry could be either (1840:32) or (1848:32) implying EXP. (S) to be either (2:34) or (10:34). No visible image in P.

TABLE 4. (Concluded)

- h. Pad shows: No  $S^L$  exposures planned, SS 0019. Secondary filters unknown.
- i. Pad shows:  $S^L_1$  7:00,  $S^L_2$  5:00,  $S^L_5$  7:00, SS 1706.  $S_1$  image may be  $S^L_5$  schedule exposure.
- j. Pad shows:  $S^L_5$  12:00,  $S^L_1$  5:00,  $S^L_2$  6:00, SS 0104.
- k. Pad shows:  $S^L_5$  7:00,  $S^L_1$  7:00,  $S^L_4$  5:00,  $S^L_2$  5:00, SS 1556.
- l. Pad shows:  $S^L_3$  15:00,  $S^L_4$  21:00, SS 1925.
- s. Stepped-image frame.

## APPENDIX

### S056 X-RAY FILTER CHARACTERISTICS

<u>Filter</u>	<u>Material</u>	<u>Bandpass (Å)*</u>
1	0.500-mil aluminum	8-16
2	0.250-mil aluminum	6-8, 8-22
3	0.086-mil titanium	6-14, 27-47
4	1.000-mil beryllium	6-18
5	3.000-mil beryllium	6-13

\*Wavelength region where the product of filter transmission and telescope reflectivity exceeds  $10^{-4}$ .



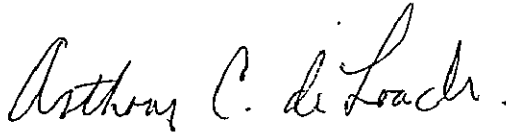
## APPROVAL

### ATLAS OF SKYLAB ATM/ S056 SUPER-LONG EXPOSURES AND STEPPED-IMAGE FRAMES

By Robert M. Wilson

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.



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